COAL AGE

A McGRAW-HILL PUBLICATION—ESTABLISHED 1911

DEVOTED TO THE OPERATING, TECHNICAL, AND BUSINESS PROBLEMS OF THE COAL MINING INDUSTRY

New York, January, 1930

VOLUME 35....NUMBER 1

Debit and Credit

IN STRIKING a balance sheet for coal in 1929, the records show up in a way to disturb the inconsolable apostles of gloom. Bituminous tonnage increased. The progressive decline of recent years in anthracite met its first check.

MORE BECAUSE of lowered production costs than higher selling prices the margin between costs and realizations appears less tinged with red. Quiet but relentless liquidation of excess plant-capacity and surplus man-power continues.

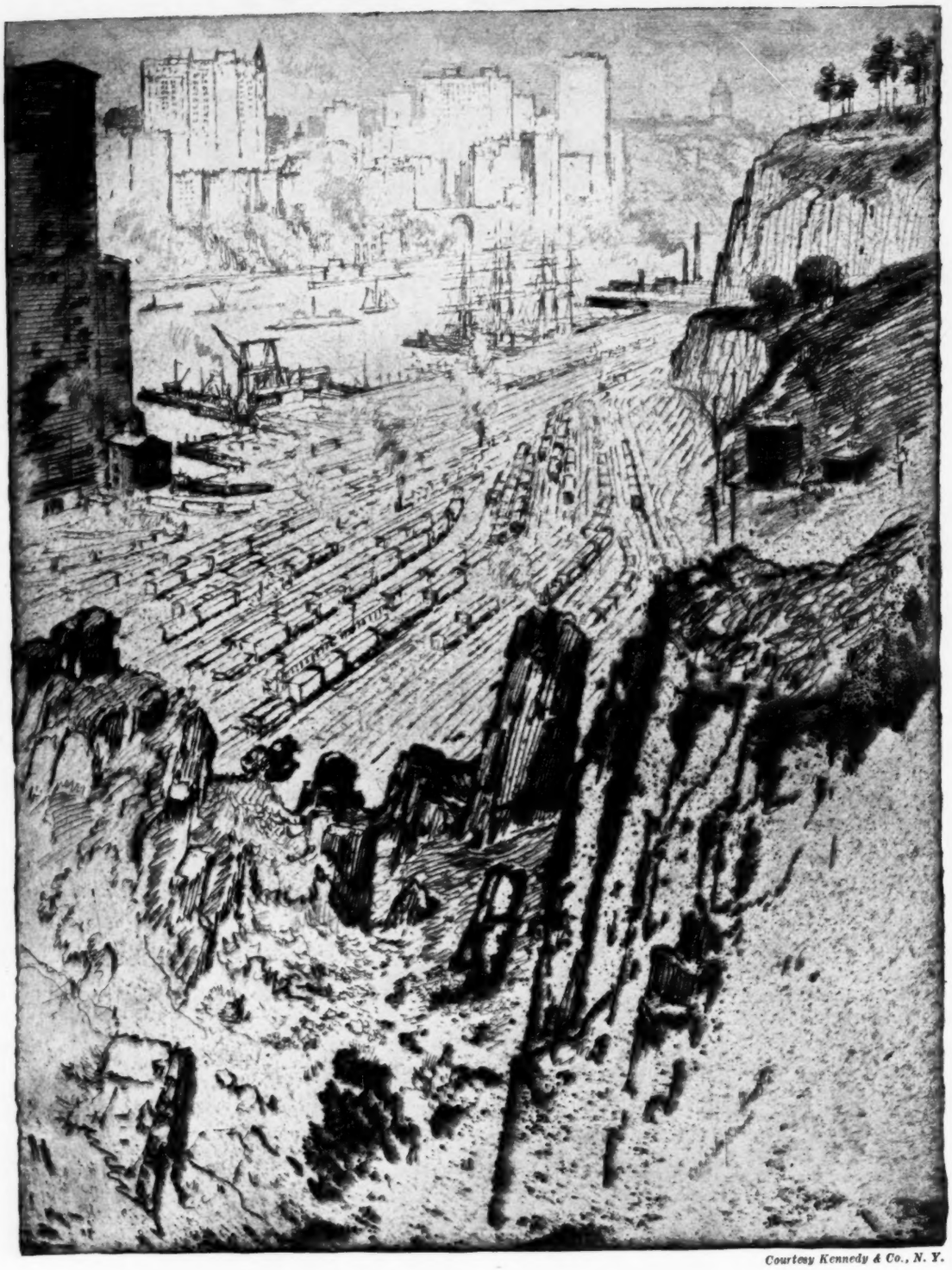
MECHANIZATION both below and above ground has made headway. Management, leaning not on tradition but acting upon intimate knowledge and broad understanding, is finding a wider place in the industry. Merchandising is pushing into the top picture.

THESE INDICIA are happy ones only as spurs to further progress. Conquest of new fields is not achieved by pipe-and-slippers enjoyment of victories already won. Opportunities yet unrealized are too great to risk the deadening opiate of satisfaction.

"FASTER — FASTER — FASTER" is the leitmotif of the age. Eight per cent of the 1929 bituminous production loaded mechanically? Double it in 1930! First steps in modern merchandising last year? Strides this year!

LEADERSHIP has made notable gains in production, management and merchandising. In not every case, however, have these advances been co-ordinated in a single organization. And there is still too big a gap between leadership and the mass of operations.

ACCELERATION and deeper penetration, therefore, stand out as the major objectives for 1930. The industry must move faster in change and the changes cut deeper. In this way only can the new tempo of business be maintained.



Courtesy Kennedy & Co., N. Y.

Coal for the Palaces of Manhattan

From an Etching by Joseph Pennell

UNUSUAL STABILITY

+ Forecast for 1930

By ROBERT M. DAVIS

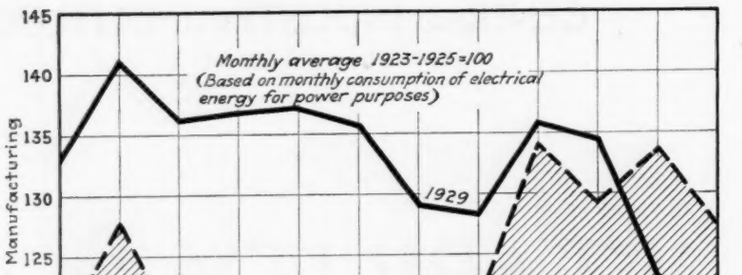
Statistical Editor
McGraw-Hill Publishing Co.

THE YEAR just closed stands out as one of the best on record for general business in spite of the decline in production and general consumption during the last quarter. The earnings of corporations was the largest in history; the volume of production exceeded any previous yearly period; and the distribution and consumption kept pace with production except in a few lines as the year drew to a close. Employment was active and industrial wages were high. The income of the farmer in general was on a par with former years. Even the industries that failed to achieve their share of the general prosperity showed in all but a few cases some improvement. While business failures were large, yet in comparison with former years it does not appear that modern competition is taking much greater toll than some 15 years ago; in fact, the situation in this respect during 1929 appears to have been slightly better than the preceding years. Building construction was one of the few industries which reported materially reduced rates of operations during the past year. On the other hand, building construction is one of the few industries which in all probability will witness increased activity during 1930 as compared with 1929.

There is no doubt that American manufacturers and business men in general enter the new year with a materially improved mental attitude. In general a wave of fear and apprehension spread over the entire country immediately following the collapse of the stock market, which resulted in a materially decreased volume of orders and a consequent general curtailment in production of materially more than normal proportions. With the opening of December and the approaching holiday buying a decidedly more optimistic atmosphere was evident in most all fields of business and industry, and even those fields reacting most severely during November now appear to be experiencing upward trends. This inherent ability of American business and industry to adjust itself rapidly to an entirely different economic plane is one of the most outstanding favorable influences on the business horizon as 1930 opens.

There are many reasons for believing that 1930 will stand out as a year of unusual stability in business and general industry. The year as a whole should witness a satisfactory level of business and industrial operations, but will not attain the superlevels of 1929. The present general business and industrial adjustment probably will not run its full course much before the spring closes. There are strong reasons for believing that the low point of general production in the present cycle was reached in December, although some industries undoubtedly have sunk to lower levels. There is little doubt that the average volume of production and distribution during

> The year 1930 should stand out as one during which one of the most interesting experiments in the economic history of the country was given a thorough test. The federal government, under the leadership of President Hoover, is endeavoring to promote economic stability in the country as a whole and to smooth out the normal and inevitable ups and downs in business. The result will set economic standards for many years to come.



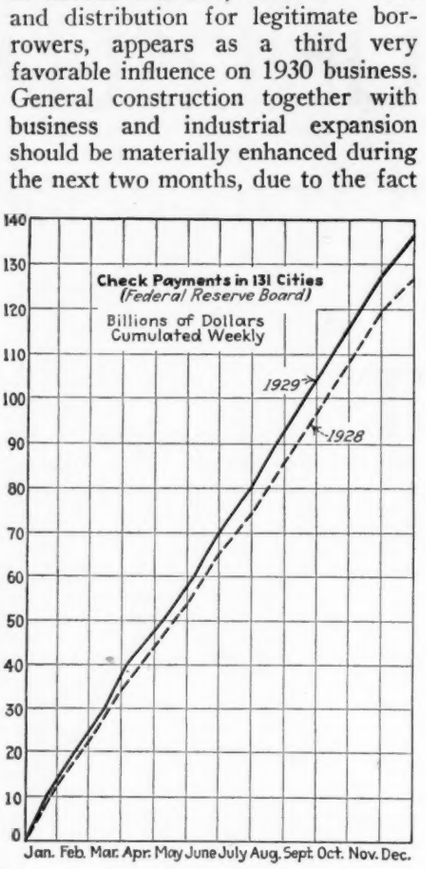
Monthly Volume of Manufacturing During 1930 Probably Will Be Less Than in 1929 Until September

the first six months of 1930 will be somewhat under that during the same period of 1929. There are reasons for believing that following a fairly normal summer season business and industry will witness a volume of fall and early winter operations which will be of proportions above those witnessed during the last third of 1929. Taken as a whole, therefore, 1930 should be an average good year for general business and industry.

Five factors stand out as the dominating favorable influences in the business situation as the year opens. First is the return of the stock market to normal levels and a comparatively stable current market. There is little doubt that the lure of the stock market had drawn the attention of many men, big and little, away from their regular occupations. In all too many instances had business organizations been drifting, carried along by the tide of generally high business activities. Such lack of attention to business was bound to result in loss of speed and efficiency. The stock market adjustment sent business men back to work, and this return of the nation's executive staff to the helm is an outstanding bright light as 1930 opens.

The second favorable influence in general business is closely tied into the first, namely, the bringing into co-operative action of the business and industrial powers of the country by President Hoover through a series of conferences with business leaders. The sound construction plans announced as the result of these conferences went far in turning the thinking of the general public into more optimistic channels. It is probable that a very large proportion of the proposed construction announced by these conferences would have been carried out without any pressure or plea for stabilization, but the announcement of these intentions has most certainly dispelled much of the pessimism which was so prevalent immediately following the collapse of the stock market. The "man on the street" now feels that in spite of his stock losses the future is safe and that the current period of adjustment will work itself out without any serious disturbance to production and employment.

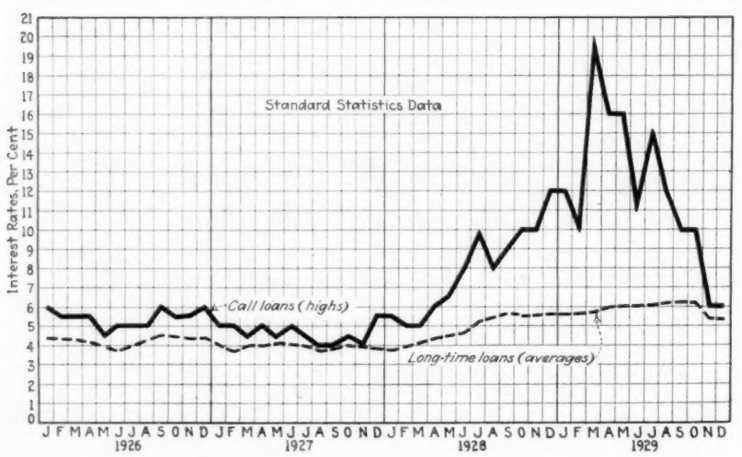
The return of the money market to normal channels, both as to rate and distribution for legitimate borrowers, appears as a third very favorable influence on 1930 business. General construction together with business and industrial expansion should be materially enhanced during the next two months, due to the fact that money will be obtainable at reasonable rates of interest.



Total Check Payments During 1930 Probably Will Fall Below 1929

It seems probable that building activity will be felt first in the industrial and public utility field. In the latter field in particular construction operations have been retarded by the sluggishness of the bond market, so that the recent improvement in that market and the definite promise of still further improvement is sure to exert a considerable influence. The electric light and power companies expect to spend about $913,000,000 on new construction during 1930, according to *Electrical World*, which compares very favorably with any previous year and is materially above the value of new construction during 1929. The program of expansion undertaken by the federal, state and municipal governments at the instance of President Hoover should also help to restore the building trades to a prosperous condition. It

Interest Rates Probably Will Be Normal and Fairly Stable During 1930

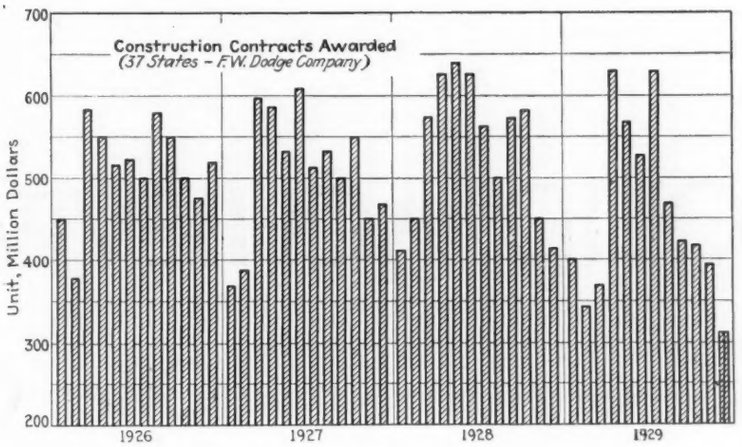


is probable that the building construction industry will lead all other industries in the upward turn during 1930; in fact it will in all probability be the only industry witnessing an increase over 1929.

Improved agricultural conditions (actual) and the more optimistic attitude (mental) of farmers stand out as the fourth favorable factor in current business. The Federal Farm Board is gradually putting its elaborate plans into operation, resulting in an increasing belief on the part of the farmer that real farm relief is to be the ultimate result. Although definite figures are not as yet available there is little doubt that the agricultural income for the 1929-1930 season will equal if not exceed that of 1928-1929. This has undoubtedly been a strong factor in maintaining the high rate of retail trade, especially during the period of industrial letdown during the latter half of 1929.

The fifth most important factor in justifying an attitude of conservative optimism regarding 1930 is the fact that inventories are in general below those of a year ago. This probably applies more to retailers than to producers and wholesalers. Buying, therefore, will tend to increase rather than diminish in the next few months, and this should be reflected in improved conditions in a number of basic industries which have been depressed recently.

Summing up the favorable influences having a bearing upon the business situation during 1930, it is obvious that the constructive influences are of sufficient magnitude and importance to justify a conservative optimistic attitude. There seems little doubt, however, that the super-levels of 1929 will not be reached during 1930.



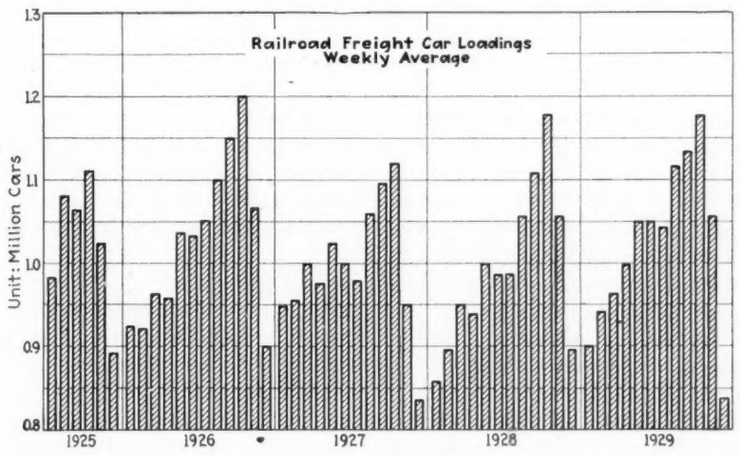
General Construction in 1930 Should Be of About the Same Proportions as in 1929, Residential Building Gaining

But every rosebush has its thorns, and there are undoubtedly some prickly thorns on the bush of current economic conditions, although the points seem to have been blunted during the past few weeks. Fear and uncertainty as to just what the future may hold is the outstanding unfavorable influence on business as 1930 opens. Factually there is little to point to a drastic decline in business and general industrial operations but fear as to possible overproduction, unemployment, decreased purchasing power, decreased sales, overstocks of goods, return of time-purchased goods, cancellation of orders, collections, etc., have undoubtedly resulted in a temporary reduction in the volume of business and production. It seems probable that this general business and industrial adjustment will not run its full course much before the close of the spring months.

The effects of the stock market deflation, while generally regarded as temporary in nature, undoubtedly did result in some actual decrease in the buying inclinations of a fraction of the general public, which is hitting luxury articles first and hardest. But there has been little or no adverse effect on the real purchasing power of the country's consumers. There is reason to believe that a considerable amount of the record Christmas savings club money was used to liquidate stock market losses instead of for holiday purchases, and during December savings banks as a whole reported increased savings over the same month in the year previous for the first time in many months. There is also the probability that the business man whose personal fortune was hit by the crash of the stock market, and there are thousands of this species, felt for some time that all business was hit as hard as he, and he has, therefore, worked under a cloud of extreme caution, which condition probably will continue until he finds that business is just as plentiful as ever if he will only go out and get it.

Installment selling must now meet the acid test. Many business men feel that there will be a very noticeable decline in sales of certain articles for quite some time, due to a hesitancy on the part of the purchasers to mortgage future earnings, as has been so prevalent during the past extended season of high industrial and business activity. There can be little doubt, however, that such curtailment of installment buying will be beneficial to business in general. Very few merchants believe that any considerable amount of time-purchased goods will be thrown back on the shelves of the retailer. That there has been a material curtailment in the buying of the luxury type of commodities there can be little doubt, but such curtailment as has taken place should be only temporary in nature.

Freight Car Loadings During 1930 in General Should Be Less Than in 1929



SOLID ACHIEVEMENTS OF

Offer Ground for

FURTHER GAINS

In 1930

WITH the single exception of a very slight decline in the weighted average price on spot bituminous coal, every statistical barometer of activity for the industry as a whole registered improvement last year over 1928. Weakness in the spot markets of the country during the first half of the year more than offset the appreciations which took place after July, and *Coal Age* Index of spot prices closed one point under the 1928 figure of 149.

Many of the developments less susceptible to mathematical measurement also showed gains. In some of these developments the changes were quite marked. Industrial relations were upon a much less belligerent basis. There was no abatement in the fury of inter-district competition, but in some fields the cut-throat scramble for business at any price was less vicious. Agreement in those districts upon standards of fair-trade practices had a salutary effect.

The shock of the Wall Street collapse of October and November touched the bituminous industry very lightly. Only in the areas close to the reactions of the steel and automotive industries was there evidence of any unfavorable repercussion and in those areas the shock was felt in a falling off of 5 to 10 per cent in current movement. Elsewhere the rising tide of domestic buying wiped out any dangerous losses in industrial shipments. Not only was production for the year nearly 25,000,000 net tons above the 1928 total but October output was 15 per cent ahead of the total for the corresponding month the year preceding, November showed a decline of less than 2.5 per cent, and December tonnage was 1.1 per cent greater than in 1928.

Of even greater significance, however, is the fact that the stock-market débâcle appeared to have no effect upon the construction program of the industry for 1930-31. At the time business leaders were called to Washington to canvass the situation last month, the National Coal Association offered consolidated reports from approximately 170 producing companies calling for capital expenditures of $44,000,000 this year. A report from the National Coal Merchants' Association covering less than 10 per cent of the numerical strength of that branch of the industry showed that the retailers furnishing information to that organization planned to spend over $10,000,000 for capital improvements in 1930.

Further confirmation of underlying soundness is found in the results of a survey made by *Coal Age* shortly after the Wall Street break. Inquiries addressed to leading anthracite and bituminous executives revealed only a few cases where the stock-market situation was influencing thinking or plans for 1930 expenditures. In no case in which a definite budget for the new year had been agreed upon by company officials, however, had there been any downward revision in proposed expenditures subsequent to Oct. 1, 1929. It has been estimated that the bituminous coal industry spends an average of $200,000,000 per year in capital improvements. There is nothing in the present picture to suggest that 1930-31 budgets will be subnormal.

That the general outlook for the bituminous industry in 1930 is distinctly favorable is a view supported by Harry L. Gandy, executive secretary, National Coal Association. Commenting on the situation for *Coal Age*, Mr. Gandy says:

"The year 1929 was what may fairly be called a typical year in the bituminous mining industry. Total production was approximately equal to the annual average of the five preceding years. We may safely say that this normal yearly output is now 525,000,000 net tons.

"Of the various movements of bituminous coal for which we have records, the figures for 1929 show a very satisfactory increase over 1928. Shipments up the lakes were 13.6 per cent in excess of those of 1928, which, in turn, had been record figures up to that date. Receipts of coal in New England during the first ten months of 1929, as reported by the Massachusetts Special Commission on the Necessaries of Life, gained 9½ per cent.

"Exports to Canada during the first eleven months were 5.7 per cent greater. Even overseas exports, which constitute a small item in the total distribution of bituminous coal, showed the substantial rate of in-

PAST YEAR

crease of 27.9 per cent over the previous year, although the increase measured in net tons amounted to only 547,109.

"In the absence of unusual factors such as, on the one hand, abnormally warm weather throughout the country or serious business recession, or, on the other hand, the closing down of the British mines because of a deadlock between capital, labor, and the politicians, or cessation of anthracite mining in connection with the adoption of a new wage scale this year, the 1930 production should show a normal increase over 1929.

"In arriving at this belief in the future of the bituminous mining industry, I have not failed to give due consideration to the various factors which have checked its growth during recent years. Consumption of coal by railroads has declined from 173 lb. per 1,000 gross ton-miles in 1920 to 125 lb. in 1929. In 1920 electric power plants consumed 3.02 lb. in the generation of a kilowatt hour of current; in 1928 this had been reduced to 1.76 lb. The iron and steel industry is said to produce the same amount of output today with approximately 12 per cent less fuel than it required in 1920.

"These figures are sufficiently impressive, but in all these lines of activity, as well as in the use of coal for steam generation in other industrial plants, there is a limit to possible economies, and the lower the consumption falls the more difficult does it become to secure proportional additional economies. The effect of these economies cannot fail to be felt less and less as the absolute quantities decline.

"Similar conclusions are justifiable with reference to the substitution of water power for steam. It is a fact publicly recognized by the electric light and power industry that economies in the consumption of bituminous coal in the generation of current have reached a point where steam is able to compete with water power. This industry is authority for the statement that the development of increasingly efficient steam-driven electric power generating units and the decreasing number of suitable water power sites, together with the fact that the efficiency of hydro-driven power generation has about reached its maximum, indicates that the bulk of future expansion in central station construction will be composed of steam plants.

"The competition of oil and gas continues to be a vital factor in the situation. Present and proposed curtailments of production in the main oil-producing areas and the increased demand for the lighter products of distillation, however, can reasonably be expected to have a beneficial effect on the coal market. Nor should we overlook the fact that there are numerous improvements taking place in the methods of utilizing bituminous coal which bid fair to increase its market substantially. Mechanical stokers are rapidly gaining ground in locomotive use and in the home. The perfection of pulverized coal-burning equipment promises to recover markets already lost to other fuels, particularly the bunker trade. Large-scale development of the by-product coke industry is opening a wider market not only for bituminous coal as fuel in the form of coke but also as the source of many valuable materials for use in other industries.

"In view of all these factors I believe that the bituminous mining industry is justified in looking forward to a period of increasing demand and corresponding increase in production."

Two developments which are attracting greater attention are mechanical loading underground and the growth of the strip-pit operations. In 1928, according to the reports of the U. S. Bureau of Mines, there was 21,599,000 net tons of bituminous coal loaded underground by mechanical and semi-mechanized

A Coal Program for 1930

1. Speed up mechanization.
2. Improve the safety record of the industry.
3. Develop better industrial relations.
4. Give greater consideration to technical ability.
5. Broaden field of sympathetic scientific manage-
6. Modernize distribution and merchandising. [ment.
7. Encourage automatic home-heating.
8. Get behind the fair-trade practice movement.
9. Seek out new uses for coal.
10. Foster research in all its phases.
11. Cultivate closer and better inter-industrial and
12. Don't be ashamed of a profit. [public relations.

equipment. Based on the rate of increase in recent years, it is estimated that the quantity so loaded last year approximated 35,000,000 tons. The percentage of coal recovered from the strip pits, which was 4 per cent in 1928, also probably will show an increase, although not as great, perhaps, as it will in 1930, when some of the big units which started late in 1929 will have had an opportunity to roll up the tonnage.

Both of these developments, of course, contribute to reductions in production costs under those attainable on comparable wage rates with non-mechanized mining. Investment in equipment in mechanical mining has given a real impetus to cost analyses and time studies and these in turn favor a greater degree of scientific management than many thought necessary under the old methods. Both developments also have encouraged the further growth of mechanical cleaning.

ON THE merchandising side of the industry more progress appears to have been made through the fair-trade practice movement than through any other source. The greater confidence which this movement has developed among producers in the same field has done much to eliminate sales methods which sapped the profits of the industry and brought it into disrepute with the beneficiaries of its merchandising weaknesses. With one exception the movement has so far been inaugurated without conference with the Federal Trade Commission and submission of codes to that body because the government board, until a meeting with Utah producers last December, had heretofore considered only national codes. It is likely, however, that, as a result of the Salt Lake meeting, a general conference between the Commission and district associations interested in the movement will be held at an early date.

The most outstanding weakness in the distribution set-up of the bituminous industry is the lack of current national data on the movement of coal. Since the publication of figures for 1917 and 1918 by the U. S. Geological Survey there has been no national canvass. Certain districts collect excellent data on the movement within the territories covered by their respective interests, but in many cases even these incomplete data are not made available to the industry as a whole.

The bituminous industry has traveled far in the direction of stabiliza-

Harry L. Gandy

tion since the peak days of the post-war booms. Liquidation of excess capacity and surplus labor has been steady since 1923 and will continue. Large-scale consolidations have not been effected with the rapidity many looking for a quick way out hoped, but there have been a number of smaller mergers, and more probably are in the offing. One significant development in this connection, however, has been the tendency to combine operating interests in Northern and Southern fields, notably alliances of Illinois and West Virginia operations.

With the record made in the past year, the ground has been cleared for further progress. The main lines along which it is believed that progress can and should be made in 1930 are epitomized in the program appearing on the preceding page.

IN ANTHRACITE the most significant achievement of the year was the check administered to the progressive decline in production which set in after the strikes of 1922 and 1925-26. In 1926 the output was 84,437,000 net tons; the next year it dropped to 80,096,000 tons, and in 1928 to 75,348,000 tons. Preliminary government estimates put the 1929 total at 76,540,000 tons. While this last figure may later suffer a downward revision, it is clear that the record, all things considered, is the best made in several years, because the slide was stopped.

Anthracite has been engaged in a battle royal for its markets during the past five years. Fuel oil, gas, bituminous coal, and coke all have been edging their way into what was once treated as indisputable anthracite territory. Growth of byproduct coke plants in Eastern states in connection with local public utilities has created a particularly menacing competition. To meet the new conditions the hard-coal industry has been compelled to change its thinking and to reorganize its program.

There is no question that this industry as a group has gone far ahead of bituminous in the past few years in a united attack upon its merchandising problems. This attack has been described in detail in earlier issues (*Coal Age*, Vol. 33, pp. 467 and 548; Vol. 34, p. 633). It looks now as if the combination of improved preparation, establishment of a real service basis, group advertising and intensified individual sales and promotion efforts, greater cooperation with the retail units in the trade and the cultivation of better public relations was at last registering in a definite fashion.

To the modes of attack enumerated in the preceding paragraph should be added the beginning of group research work into combustion problems and a more direct participation in the question of the development of new equipment for home heating. Here, too, the industry, enjoying a compactness of location and of interest not conferred upon soft coal, has gone much further than the bituminous industry. Whatever research is being pursued in the bituminous industry is still individual or through small groups working through other agencies.

IN DETAIL—

The specific developments in the industry treated broadly in this review are analyzed in greater detail in special articles elsewhere in this issue. Among these articles are:

MECHANICAL CLEANING

+ Dominates New Year Thinking

By ALPHONSE F. BROSKY
Associate Editor, Coal Age

IN THE mechanical cleaning of coal the most striking development of the year was not in new processes or design but in the great increase in the production of cleaned coal. Broadest progress continued in the Pittsburgh region, where, it is estimated, the production of mechanically cleaned coal was doubled in 1929 in a vigorous movement that is likely to double the present production in 1930. West Virginia is well on the way. Operators in the southern end of this state are thinking and acting along the lines of mechanical preparation.

Some headway is being made in other major bituminous fields—the exception being Illinois—but progress is slow. In general the operators are conscious of the importance of mechanical cleaning, but the majority are standing by, watching the results of pioneering ventures toward the building of more select markets.

In the anthracite fields cleaning plants are being planned and installed by some companies with an external nonchalance that bespeaks a realization of necessity. But continuing improvement is not region-wide. The choosing of equipment types continues as a free-for-all, urged by arguments as to the desirable limits of final recovery.

The geographic center of activity in mechanical cleaning of soft coal remained fixed last year in western Pennsylvania, where the bituminous industry is a neighbor to steel. There, spurred on by the achievements of commercial producers, such as Pittsburgh and Hillman, steel companies showed signs of a serious intent to remove excess fuel impurities at the mine and not in the furnace at the steel plant. It appears that those engaged in the field of metallurgy have been aroused at last to the inevitability of their using a fuel as free of ash and sulphur as is consistent with best practices.

Aside from the economy in metallurgical processes derivable from mechanically improved coal, steel manufacturers, owing to the rapid depletion of typically coking coals, are finding it necessary to improve their present fuel supply so that it will be of value equal to the coal of low-sulphur content which was once available. This necessity is opening the door to a new market for some coals which heretofore were not considered suitable for coke-making. The low-volatile coals of central Pennsylvania and southern West Virginia fall into that class. So may be classed some coals of much higher volatile content whose sulphur content is or can be made sufficiently low.

This factor and others are furnishing impetus to the blending of qualities and sizes of coals into a single product. More thought is being given to this phase of preparation, about which, admittedly, little is known. But there are a few who have far outstripped the ranks of producers in this new field, as, for example, the Rochester & Pittsburgh Coal Co.

One steel man calculates that each per cent of ash reduction in the coal used in his plant effects a saving of 17c. per ton of pig iron. The total saving aggregates 60c., less a charge of 28c. for washing the coal, per ton of pig iron. There also is the saving accruing from coals of lowered sulphur content. The possibilities in such savings are indicated in Figs. 1 and 2 by graphs constructed from tables included in a paper entitled "Coal Washability Tests as a Guide to the Economic Limit of Coal Washing," delivered at the 1929 annual meeting of the A.I.M.E. by George Stanley Scott, then chief chemist, American Rhéolaveur Corporation.

Already the vanguard of the steel makers' procession into the field of advanced mechanical cleaning has been formed about the Jones & Laughlin Steel Corporation and the Youngstown Sheet & Tube Co. In this deliberate technical step forward by these independents is seen the forcing of the hand of the country's two largest steel companies. Further, this step is said to presage cleaning in the not distant future of all coals going to the making of metals.

The fields most completely equipped for doing a thorough screening job continue to manifest least interest in mechanical cleaning, while other fields largely equipped only for rough screening have already provided material evidence of their intentions toward cleaning. Thus, the southern Illinois field, where screening facilities are complete, has held off from mechanical cleaning. On the other hand, the western and central Pennsylvania fields, where many plants are equipped with stationary screens, are forging steadily forward in cleaning-plant construction. Southern West Virginia is an exception to this analysis, for in this field mechanical cleaning is following after wide progress in screening. The position of southern Illinois is the more confounding in that her mines are heavily mechanized for underground loading. Incidentally, the prediction is current that the only stimulus this field needs

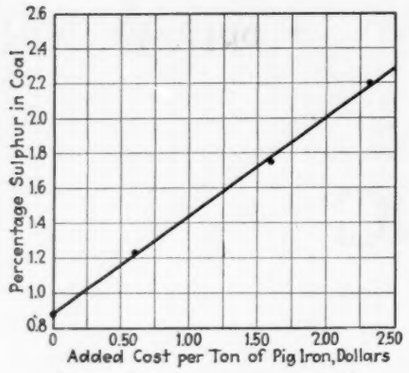


Fig. 1—Cost of Sulphur in Fuel in Metallurgy of Iron

to cause its operators to fall bodily into line is the installation of one separation plant.

Perhaps it will be the Illinois strip mines that will take the initiative, following the example of the three strip pits in Indiana that are already equipped for cleaning coal mechanically. Time is of essence in the operation of a stripping shovel and whatever changes might be made to speed up this mechanism are favorably reflected in the costs. Where stripped coal is cleaned mechanically, less care need be exercised in differentiating between spoil and coal in the shovel operation. Observers point to the strip mines as the logical starting point for mechanical cleaning in the Middle West.

Many operating eyes are on the pneumatic cleaning plant being erected at the Wildwood mine of the Butler Consolidated Coal Co., near Pittsburgh. The interest is centered not so much on the cleaning process itself as on the principle on which it has been predicated by the Allen & Garcia Co., retained to design and manage this operation. These engineers aim to mill the coal at this plant, as ore is treated in metal mining. At this plant every pound of coal is to be loaded mechanically and passed through the cleaning plant.

Another installation that also is being closely watched is the central cleaning plant of the Ashless Coal Sales, Inc., at Ravenna, Ky. This plant will handle the minus 2-in. coal of three mines in the Hazard field and plans have been projected to treat coal from mines outside the combination. The present capacity of the plant is 75 tons per hour, and the equipment, which is of the pneumatic type, will be operated 20 hours a day. It is proposed to enlarge the capacity of this plant as the need for doing so grows.

Eastern Kentucky has for some time been faced with a discouraging seasonal problem in the marketing of slack coal. This plant is intended to solve that problem of distress coal, it is said. Widespread attention has been drawn to this plant because of its remote position from any mine. If this project proves to be as successful as anticipated, other smaller producers are likely to pool their interests in a similar undertaking.

In the last year signs appeared of the trend toward the installation of more crushers at the mines, not only in connection with cleaning plants but to move the mine output when the demand for domestic coal lags behind the demand for stoker coal. There are some who see in this movement a rapid approach of the time when all coal will be burned as small sizes. This matter of sizes in relation to changing combustion methods is destined to be a problem of significance to anthracite producers.

Menzies hydro-separators continued popular, chiefly in West Virginia and the anthracite region. Close to 200 of these units are now installed in anthracite and bituminous plants, in a division about equal. Though at present this equipment in the anthracite region has been confined largely to the cleaning of steam sizes, in some quarters the belief is current that its limit of utility may be extended to the prepared sizes, as in bituminous practice.

AN important step forward in 1929 in the anthracite region, thinks Paul Sterling, mechanical engineer, Lehigh Valley Coal Co., Wilkes-Barre, was the improvement of methods for reducing the ash content of fine coal. But all is not as it should be in anthracite preparation, in the eyes of Mr. Sterling, who, in a paper presented before the Engineers' Society of Northeastern Pennsylvania, Scranton, March 21 (see *Coal Age,* April, 1929, p. 225), pointed out several of its shortcomings. He is of the opinion that more stress must be laid on purity of anthracite than on appearance. If anthracite were sold solely on an analysis basis much coal now condemned would be reclaimed profitably. This, he has proved to his own satisfaction by tests.

According to him, maximum recovery is dependent on a close association between the mines and preparation plants, with a view toward an improved product through the better blending of raw feed from the different beds. He suggests the need for more efficient breaking of anthracite, an important phase almost altogether neglected in the scramble to improve the appearance of the product by condemnation methods. More money, he asserts, is lost in the breaking of coal than is wasted in sending good coal to the dump. He contends that a coal breaker more efficient than the type now used can be designed.

That more general recourse is being made in the anthracite field to flat pickers as a means of classifying coal in conformance with fracture preliminary to classification by specific gravity methods is a comment contributed by W. C. Menzies, Scranton, Pa. Incidentally, tables are being tied into some of these plans. Thus, the Lehigh Coal & Navigation Co. recently installed two Deister-Overstrom diagonal deck tables at its Nesquehoning colliery for cleaning flat nut after separation from cubes by a flat picker, the cubes being cleaned by jigs. This company is said to have put in a duplicate installation at its Coaldale colliery.

Cadwallader Evans, general manager, Hudson Coal Co., Scranton, Pa., gives as the outstanding development of the year the trend away from

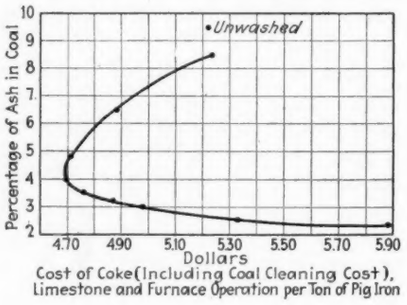


Fig. 2—Cost of Ash in Fuel in Metallurgy of Iron

jig preparation as it had been practiced heretofore, to one of the other methods being adopted instead, as Chance or Rhéolaveur.

As already intimated, last year's crop of new equipment of major importance to cleaning fell behind that of recent preceding years. An exception was the new Menzies tandem or two-compartment hydro-separator brought out by the Wilmot Engineering Co., Hazleton, Pa. As this machine "takes two shots at the coal," it is said to give a cleaner product and to make possible a higher recovery.

As shown in Fig. 3, raw coal enters at *B* and passes to the separator compartment *C*, where it is given a preliminary classification. Refuse from this first cleaning is discharged from *D* to a conveyor. Coal, with mid-

dlings, is passed from compartment *C* to the separator compartment *E*, which gives it a final cleaning. The middlings from this compartment is discharged from *F* to a conveyor which returns it to the head of the separator, where it is merged with the raw feed. Refuse from this second separator compartment is discharged into compartment *D* and removed by conveyor. The capacity of the unit is 25 tons per hour handling sizes in the range of buckwheat.

Early in November one of these units, the first to be installed, was put into operation at one of the anthracite collieries for cleaning barley coal with an ash of 18 to 26 per cent. Results released by the mechanical engineer of the coal company show a clean coal bearing 11 to 13.75 per cent ash and an average of 12.5 per cent.

Perhaps the biggest recent development in jigging is the tendency toward larger units. Until recently, operators held that jigs had been developed to the maximum of practicable unit size. But experience with other processes involving more massive equipment has encouraged consideration of larger jigs. The Philadelphia & Reading Coal & Iron Co. has installed a number of Simplex jigs with a maximum capacity of 150 tons per hour.

To this enlarged Simplex jig have been added improvements in the pan movement which are said to increase its efficiency. As the pan is now devised, all moving parts are above water; adjustments of the pan throw can be made during operation and the pitch is adjustable from the top; finally, variations of strokes and throws can be made as between the feed and discharge ends of the pan.

PROGRESS, though slow, is noticeable in the simplification and co-ordination of units embracing hand picking, mechanical cleaning and the general handling of coal from mine to railroad car. This phase is uppermost in the minds of many producers who want a plant that needs no great modification, once it is installed.

A further trend evidenced in the past year, states Charles Enzian, chief engineer, Consolidation Coal Co., Fairmont, W. Va., "is in the direction of increased research, with special emphasis on the determinination of critical zones in the run-of-mine product and on treating such parts or portions of the product in a manner to meet most nearly the exacting consumer specifications at the lowest possible increase in cost to him." There can be no doubt that the new thinking embraces expansion into the field of research. It brought into the industry in the last twelve months a number of new faces, of men skilled in chemistry and physics, metallurgy and combustion. Though the number was relatively small, the signs are encouraging.

Advances in launders and jigs for the wet-washing of egg, as well as

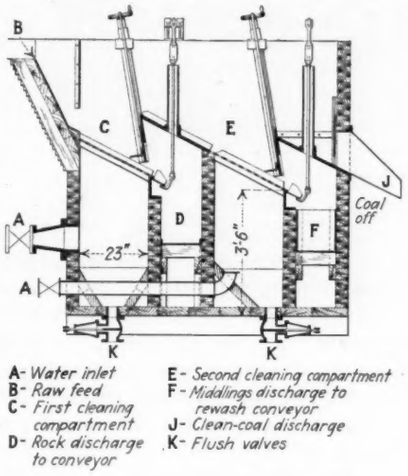


Fig. 3—Construction of Tandem Hydro-Separator

stove and nut, strike H. D. Smith, assistant to the president, Ashland Coal & Coke Co., Bluefield, W. Va., as an achievement for the year. In dry cleaning, he adds, progress has been made toward decreasing the pre-screening requirements, toward broadening the range of sizes that can be handled and toward increasing the capacity of the table.

Expectation is growing for the coming of froth flotation in the preparation of bituminous fines for metallurgical fuel—not makeshift equipment, but substantial commercial plants—believes Thomas Fraser, Carnegie Institute of Technology, Pittsburgh, Pa. This possibility also is commented on by Erle G. Hill, of the department of metallurgy University of Pittsburgh, whose remarks follow:

"A problem that has received a good deal of attention is that of drying fine coal. I believe the centrifugal filter, such as is used in the new plants of the Pittsburgh Coal Co., has done pretty good work. However, I think more research is needed on selecting the material for the screens. Many new alloys are now available for this use.

"To my mind, the advance in flotation of coal depends on the ability of the operator to dry fine coal. Of course, we can float coal coarser than ¼ in., but in most cases the advantage of flotation lies in the fact that the finer the coal is crushed, the cleaner is the product. So I expect to see flotation used mostly on quite fine sizes. This means again that drying will be the big factor. While flotation is a simple process, experimentation, I believe, is needed to determine the best reagents for coal and for dropping the pyrite.

"In this connection it might be of interest to know that in the flotation of sulphides in ores it is easy to drop pyrite by the addition of lime. The use of chemical reagents instead of oils for collectors also has aided in the elimination of pyrite. These might be tried on coal. There is a possibility that some organic reagent which is not an oil, similar to those now used in ore treatment, might be developed for coal."

Only a few examples of central cleaning plant construction can be pointed to for 1929. However, reports verify the understanding that a number of companies are planning such plants. The point has already been reached where the railroads are being made to realize that freight rates soon will have to be adjusted to provide for a cleaning-in-transit rate for the hauling of coal from several mines to a central cleaning plant and thence to the consumer.

WHATEVER might have been the progress in mechanical cleaning in 1929, it means less when considered in itself than when linked to the progress that has gone before, as an index of what is to come. The industry at large is agreed that mechanical cleaning, like mechanical loading, must be pushed forward quickly to common practice, because of the economic reasons involved. Yet there are those who frown on the operation as an advantage to the consumer only. They fail to see that the problem of merchandising a new product advantageously can be solved only through the experience gained in selling that product. They fail to see that the problems of producing and merchandising the product must be solved simultaneously and progressively.

This article has been limited chiefly to a discussion of the broad progress and trends in the technical and economic aspects of mechanical cleaning. For information regarding plants and types the reader is referred to an article entitled "Top Works Construction Active in 1929," page 48.

ANTHRACITE

+Experiments With Research

An Interview With

R. V. FROST

Frost Laboratories
Norristown, Pa.

"THE prime purpose of the research carried on here at Norristown is to widen the consumption of anthracite. People are now concerned with convenience and comfort rather than increased labor, and on this fact is based our investigations," was the declaration of R. V. Frost, head of the Frost Research Laboratory, Norristown, Pa., the seat of efforts to promote the more economical and efficient use of anthracite.

Manifestly, if a consumer can be shown that it is to his interest to use anthracite, and that he can secure equipment in which it can be burned with profit and convenience to himself, a long step toward furthering its use has been taken. Activities at the laboratory, therefore, have been devoted to the testing and developing of stokers, heat-control devices and ash-handling systems, as well as to conducting burning tests to determine accurately the relative efficiency of anthracite, coke and other fuels.

The movement toward organized research originated a little over a year ago at a meeting of the hard-coal producers at Lehigh University, for the purpose of outlining a program for the industry. After operators had heard experts in the field of research, two major lines of activity —preparation and more efficient use of anthracite—were adopted. The latter was delegated to the Frost laboratory.

Since beginning work, practically every form of stoker which is designed for use with anthracite or which might conceivably be adapted to that purpose has been tested at Norristown. In addition, a number of boilers, heat-control devices, and other auxiliary equipment have been the subject of investigation, and tests have been carried out with other fuels than anthracite. Manufacturers and inventors of equipment for use with hard coal are encouraged to submit their machines, and these are set up on the laboratory floor and put through a routine of what is known as performance tests. These include fuel tests, evaporation tests, capacity tests, efficiency tests and others necessary for a complete knowledge of the performance of the plant or equipment. Not only were the plants or equipment tested as originally submitted but improvements or changes were incorporated when possible to note their effect on combustion and efficiency.

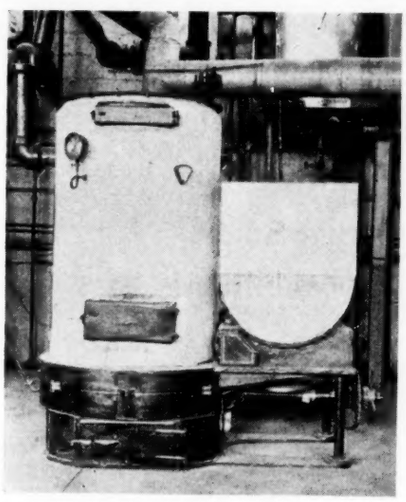
As carried out on the laboratory floor, these tests give an accurate record of the performance of the fuel-burning or regulating device and in the case of heating plants, are supplemented by others carried out under actual operating conditions in the household. The policy of the laboratory has been to test an actual installation of the plant submitted in every-day use at a residence, if one can be found in the vicinity. If none is available, the plant is set up in a home for the purpose of making observations after its sojourn on the testing floor.

Plants or equipment meeting the requirements are then approved and a printed report is issued for the

> In ten or fifteen years coal will be delivered in closed, hopper-bottomed trucks of steel, fitted with a suction apparatus. The consumer's bin will be an airtight steel tank with a 4-in. hose connection and a vent. Coal will be blown from the truck to the bin, from which it will feed by gravity to the stoker, or from which it will be pneumatically conveyed to a closed hopper. Ashes will automatically be sucked out of the ashpit and blown by air to a container on the outside of the building—all with complete freedom from dust. This is not a visionary dream. Every step has been worked out to a practical solution and merely requires the confidence of capital to make the development of commercial value.—R. V. Frost, before the meeting of the Anthracite Club of New York, Sept. 16, 1929.

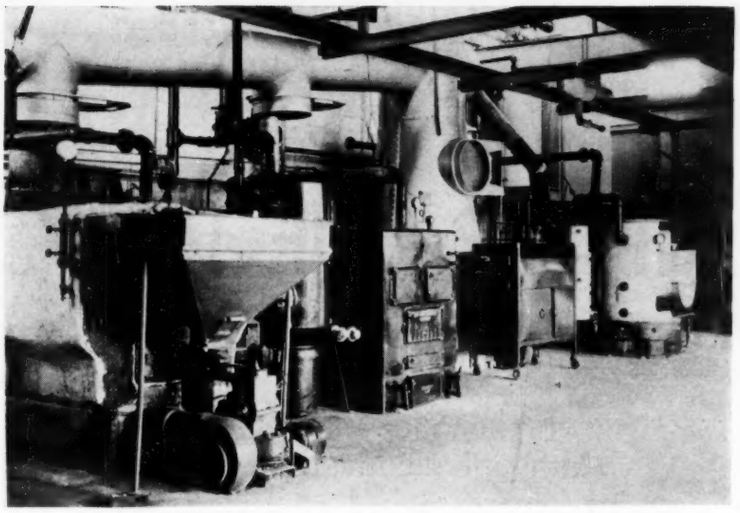
information of the public. Five firing devices — Electric Furnace Man, "Motorstokor," and the Wedge, American and Metropolitan stokers —have been approved to date and reports issued. Among the heat regulators tested, the "Balanstat," controlled by the Anthracite Equipment Corporation, has been approved and a report sent out. Other approvals on which no report has as yet been issued include the Minneapolis-Honeywell, Gifford, Pioneer, Sheer, and other types of regulators. In addition to granting approvals on satisfactory equipment, the laboratory extends aid to manufacturers and inventors in the form of recommendations for changes or improvements.

Perhaps one of the major accomplishments has been the development of the Wedge stoker. This machine cannot be installed with any boiler but is furnished with a special boiler in one unit. In operation, coal from the hopper falls onto a revolving plate, driven by the same motor that operates the blower. A plow scrapes the coal off the feeder, from which it drops to a circular revolving grate. As the fuel travels around on the grate, a spiral partition pulls it progressively closer to the center. Thus fresh coal is added at the outside and the ashes fall into the ashpit through a circular opening in the center.



Laboratory Installation of the Wedge Stoker

The plant is fully automatic and requires no attention whatever, except for removing the ashes from the ashpit. With a 28-in. stoker installed in connection with a steel, vertical-fire-tube boiler, the maximum capacity obtained in laboratory tests was 2,900 sq.ft. of equivalent water radiation, or 30 per cent above the allowable maximum for a surface-burning boiler of equal grate area. Notwithstanding this high capacity, the remarkable efficiency of 85 per cent was obtained over 48-hour periods. No attention was given the fire and the ashes were clean and free from combustible material. When operated at low rates, equally high efficiencies were obtained, with the same satisfactory operation.



Testing Floor of Frost Research Laboratory, Norristown, Pa. (Wedge Stoker at Extreme Right)

"It has been demonstrated," said Mr. Frost, "that coal can be much more efficiently burned in the ordinary domestic heating plant than is generally supposed." Most people think that it is burned with an efficiency of only 50 per cent, which actually is considerably below the actual figure of close to 80 per cent.

Comparative tests as between different sizes of anthracite and as between anthracite and other fuels have been made in the laboratory at Norristown. These tests showed that with the ordinary surface-burning boiler, pea coal can be burned at a higher efficiency than the larger sizes of anthracite, the figures being 80 per cent for pea and 70 per cent for the larger sizes. As between pea coal and coke at $10 per net ton, coke, on the basis of the heat value delivered, cost 16 per cent more, and on the basis of the net ton as sold, 23 per cent more. Conclusions point to the fact that as high an economy can be obtained with pea coal as any other fuel.

Present effort at the laboratory is being devoted largely to the development of ash-handling systems for use with domestic heating plants. Recognizing that the labor necessary with the older type of plant is a big drawback to the use of coal, efforts will be concentrated on the perfection of equipment that will handle the coal from the truck to the furnace and the ashes from the furnace to the sidewalk with the minimum of physical effort.

Pneumatic ash-disposal systems seem to offer the greatest benefit. Taking ashes from the pit to the sidewalk by either a suction or a blowing device appears to be the simplest and most logical method and the laboratory is confining its attention at present entirely to machines employing this principle. Two machines, the Allen Air and the Epp, are now undergoing investigation and others will be tested in the future.

As the study of ash-handling equipment is expected to extend over a long period, no other projects than those outlined above have been definitely scheduled. New uses for anthracite or extensions in the industrial field are not contemplated at the present time, though some thought has been devoted to anthracite as a source of gas, and it may be the subject of investigation in the future.

Automatic burning of the smaller sizes has been demonstrated to be the most efficient, though laboratory experiments have shown that the principle can be extended and the larger sizes fired in a magazine heater. However, this line of investigation was not pursued because of the fact that the larger sizes sell at premium prices. Therefore, under the present price differentials and in view of the fact that it has been proven that the smaller give a greater efficiency, it would manifestly be impossible to interest the consumer in an automatic plant using the larger varieties.

FAIR-TRADE-PRACTICE CODES

Although the first trade-practice conference was held by the Federal Trade Commission late in 1919, when representatives of the creamery industry met with Commissioner Colver and Attorney Flannery at Omaha, Neb., it is only within recent months that the movement has been taken up actively by the bituminous coal industry. By the end of 1929, however, eight local associations with a membership of approximately 100,000,000 tons had joined the movement, and one, the Utah group, had submitted a specific code to the Commission for its approval. In the six articles which follow, some of the men who have been most active in this movement review its accomplishments and its possibilities.

WHAT Has the Movement to Offer?

By E. C. MAHAN
Chairman, Trade Practice Section
Market Research Institute
National Coal Association

THE PARTIAL ADOPTION of the trade-practice movement was the outstanding development in the coal industry during 1929. This movement gained a foothold for the first time, and, before the year was ended, a substantial tonnage was being marketed under some sort of trade-practice arrangement. In view of the results obtained in something like ninety other lines of industry, and the manifest enthusiasm of those in the coal business who have tried the plan, it is a source of some surprise that the spread of the movement in the coal business has not been even more rapid.

By the end of the year, eight local associations, producing about one hundred million tons of coal, were operating under some kind of trade-practice arrangement. In addition, it has been definitely decided by a number of other coal associations to put the plan into practice in the immediate future, and unless all signs fail, it should spread to many additional producing fields before the end of 1930.

The writer is affiliated with three local associations—Harlan, Southern Appalachian and Hazard—in which the plan has been in operation for from seven to nine months. I have yet to hear a single operator in these fields express himself as being dissatisfied with it, or show the least inclination to return to the old blind method of selling coal. Since I have been intimately connected with the development of the movement in these associations, especially so in Harlan and Appalachian, I will confine my comments to the results that I think have been accomplished in these associations:

1. *There Has Been a Decided Difference in the Attitude of the Operators Toward Each Other.*—The trade-practice arrangement has resulted in operators getting together at least once a month for a frank discussion of business conditions. They have come to know each other much better, and have found, in many instances, that some of their fellow operators whom they had not regarded favorably were not such bad fellows after all. A frank discussion of common problems has resulted in a much

Open Door to Stabilization

better understanding. The not infrequent attitude of individual antagonism has very largely been replaced with a desire to be helpful in the solution of common problems.

2. *The Operators Have Ceased to Have Exclusive Interest in Questions of Production and, Instead, Are Giving Their Major Attention to the Marketing End of Their Product.*—In this section of the country, as in every other, there are some operators who have preferred to run regardless of price. Under the present trade-practice arrangement the operator who has coal of similar quality and preparation to that of his neighbor, and is unable to market his coal on as favorable a basis, is ashamed to admit it. Frequently he would rather have short running time than publish a price which he knows is out of line with what his neighbors are asking. This change in the psychology of the operator from the old basis of putting the emphasis on production to the new basis of putting the emphasis on marketing has been the outstanding contribution of the trade-practice movement.

3. *It Has Helped Greatly to Stabilize Prices.*—Under the old blind method of marketing coal, none of the operators had any definite prices. One day one operator would be in urgent need of business on a certain grade of coal, and the salesman representing such an operator would, of course, be familiar with the situation. He would, in turn, find a chance to move this coal at an unremunerative price. The operator, fearful that some competitor would take the business if he failed to do so, would instruct the salesman to book the order. The next day another operator would be in the same situation, perhaps, on a different grade of coal. The result was, the price of coal was constantly fluctuating and the sales forces themselves were active contributors to this demoralized condition.

E. C. Mahan

Under the present arrangement the salesmen know that the coal will have to move at the price at which it has been listed. It has been surprising to find how easily they could move distress coal at this price, while under the old method they would not have made even an honest effort to sell the coal at the asking price. A byproduct of this is that the operators and their sales forces are beginning to have a feeling of self-respect that comes only when you are offering your product to the trade at a price that means something.

4. *It Has Eliminated the Evil of Consigned Coal.*—Not since the formation of these trade-practice bureaus has there been a report of a single car of coal being shipped on open consignment.

5. *Our Customers Are Better Satisfied Than They Were Before.*—They like the idea of a price that can be depended upon. Most of them appreciate the attitude of a group of coal operators who have the nerve to try to stabilize their business. The retail coal dealers, especially, resent the fluctuations that frequently characterize the market on domestic coal, even in the winter months. Especially do they resent the evil of consigned coal. The coal dealers have almost, without exception, expressed their hearty approval of the trade practice movement. Manufacturers and other users of coal have generally expressed themselves as approving the efforts of the operators in these fields in which the fair-trade codes are in effect to market their coal in a more orderly manner.

6. *To Secure Results You Do Not Have to Have 100 Per Cent Co-Operation.*—If just a few operators in a given field get together under a trade-practice arrangement they will be able to effect a noticeable improvement in their situation. Of course, the more the better. If a code is adopted by your association, and is not adopted by your neighboring associations, you still can obtain excellent results. Of course, it would be much better if it could be adopted generally, and the more who do adopt it, the better will be the results; but, fortunately, it is one association movement in which the one who does not participate is certain to be the loser.

There are numerous other features that could be gone into but these are enough, it seems to me, to convince any right thinking man that there are real advantages to be obtained from this trade-practice movement. Of the ninety industries that have embarked on the plan under the auspices of the Federal Trade Commission, none that has started it has abandoned it. The Federal Trade Commission has had two conferences with the coal industry, Commissioner Humphrey having met with the Utah operators in Salt

R. E. Howe

Lake City on Dec. 3, and Commissioner March with the Lake Superior Coal Dock Operators on Jan. 4. I understand it is the intention of the Federal Trade Commission to have conferences with coal operators, by districts, for the adoption of trade practice plans and ethics, as the situation warrants. It seems to me the coal operators will be passing up the first real opportunity that has presented itself in years for a better handling of their business problems, if they fail to take advantage of this offer of the Federal Trade Commission.

I do not want to convey the impression that the experience of the associations with which I am connected has been everything that could be desired. It has not been such by any means. One of the things that we had clearly in mind when we started the movement was not to expect too much of it and not to undertake too much at the beginning, believing that after we found out how to work together, we would then be in a position to go forward. Of course, in working the arrangement out many problems have presented themselves, and some of them are still unsolved; but we are making progress and have no thought of going back to the old methods. We are hopeful that before the present year is ended we shall have lots of company, and we feel sure that those who do join us in this forward-looking movement will feel much more like wishing everyone a happy new year at the end of 1930 than they did at the end of the year 1929.

INDIANA Ready to Try

By R. H. SHERWOOD
Chairman of the Board
Coal Trade Association of Indiana
Indianapolis, Ind.

NO one could reasonably fail to thoroughly approve the establishment of a code of ethics in industry on principle. The debatable angle is as to its workability. I note that very many industries have established a code of ethics, which is an excellent sign. Much good probably will come of the movement, even if not successful in all instances. It appears to me that this activity has a greater chance of success where the industry involved is dominated by comparatively few large corporations, who by their size and prestige are able to control the situation. Unfortunately, the coal industry is split up into many units, some of them quite small and irresponsible. Whether it is going to be practical, in an industry so situated, to operate a fair-practice code 100 per cent or nearly so, is yet to be demonstrated.

We operators in Indiana expect to make an attempt to establish a code of ethics and are just putting the wheels in motion to that end. I hope that *Coal Age* will canvas the situation annually for the next year or two, so that we may learn what our fellow operators in other fields are attempting and accomplishing.

R. H. Sherwood

EXPERIENCE Proves Benefits

By R. E. HOWE
Secretary-Treasurer
Southern Appalachian Coal Operators' Association
Knoxville, Tenn.

THE Southern Appalachian Coal Operators' Association adopted a code of trade practices about the first of last March. The effect has been helpful beyond the expectations of the most optimistic. As one large operator has expressed it, it has been the cause of increased personal self-respect, increased confidence in his fellow operator, and has been a stimulus to his own sales force.

One of the greatest single benefits that we have derived from this plan has been the absolute elimination of consigned coal.

Another outstanding benefit from this code of trade practices is in the *mind* of the operator. His outlook and his views with reference to his business are changing; he is getting away from that old theory that he must run his mine every day, regardless of the financial result; he is becoming "profit-minded"; he is fast coming around to the realization that it is better to run part time at a profit than full time at a loss. The operators in this field are also beginning to realize that their keenest competition is among themselves, and this evil is best overcome by friendly and frank co-operation.

Rules in codes approved by the Federal Trade Commission fall into two classes. Group 1 rules cover practices the Commission considers illegal. Group 2 rules cover practices the industry itself considers illegal. Violation of Group 1 rules will be prosecuted by the Commission if brought to its attention. Observance of Group 2 rules rests with the industry.

We cannot recommend too highly

the adoption of this code of trade practices by the operators in every section of the United States. We believe that with the co-operation of the Federal Trade Commission in this matter, the coal industry, as Commissioner Humphrey said in Salt Lake City last month, may achieve decency rather than have the government enforce decency upon it.

MEANS Real Self-Government

By OLIVER J. GRIMES
Secretary
Utah Coal Producers' Association
Salt Lake City, Utah

Oliver J. Grimes

THE trade-practice conference is the open door which invites the coal industry to co-operate in law enforcement through self-regulation. In no way altering existing law, it is an assemblage, under auspices of the Federal Trade Commission, at which members of the industry interpret the law by defining specifically what are unfair practices and agree to abolish such practices voluntarily on a given date. The rules adopted, when approved, will be enforced by the Federal Trade Commission if the industry itself is unequal to the task of self-regulation.

Honesty is inherent in the normal human and most persons are about normal. It is the unbalanced minority that is inherently dishonest and which wreaks havoc in business; possibly it only "cuts corners" in the beginning but gradually its encroachments grow and thrive to the limit that may be pursued without encountering legal restraint. And, because of the many technicalities which may be involved and the delays and expense usually attached to litigation, the honest business man finds it more convenient and effective to fight fire with fire.

In that way an entire industry may become involved in unfair and uneconomic practices which eventually lead to disaster. And, when everybody is doing it, there is slight incentive for any individual to seek legal redress when the action might land him in a similar difficulty. Most members of the industry would welcome the return to the honest policy, but usually by the time they realize the hopelessness of the struggle their affairs are in a precarious state. They also are harassed by the belief that group action in busines is in violation of some statute and will bring prosecution or persecution.

The new attitude of the Federal Trade Commission, as reflected in the trade-practice conference, is rapidly removing this fear of persecution. Members of an industry, once the legal limitations are reasonably well defined, no longer are afraid to come together and discuss matters of mutual interest. And, when they get together, each finds the other a pretty decent chap, and distrust and ill-will soon are dissipated. Constructive policies and a concert of action, not possible in an industry at war with itself, are readily adopted and eagerly undertaken. The business becomes a business because it has a solid foundation on which to build, and stabilization is a natural sequence. In the ultimate, economic waste is reduced to the minimum and the public as well as the industry benefits. But to remain stable, any industry always must observe its obligation to the public.

The trade-practice conference is the most promising medium now available for stabilizing the coal industry. Maybe it is not broad enough in scope to cure all economic ills, but that can be decided only in the light of experience. All machinery is perfected as its limitations are discovered through usage. Let's make the most of this and perfect it, if need be, as we progress.

SUCCESS Invites Extension

By E. R. CLAYTON
Secretary
Harlan Coal Bureau
Harlan, Ky.

THE successful operation of a fair-trade practice code in the Alabama, southern Appalachian, Virginia, Utah, Hazard, Kanawha, Williamson County (W. Va.) and Harlan districts is an answer to the natural question, can the code be applied to coal? The feeling is rapidly spreading that the coal industry can be conducted on equally as high a plane as any other business in America, if it is given the proper opportunity. That is really what a code of ethics or trade practices does. It is a yardstick by which your relationship with each other and with the public is measured.

The time is rapidly approaching when the purchaser of coal will hesitate to enter into contractual relations with members of the coal industry unless his business is protected by a code of trade practices, as there always will be that suspicion in his mind that he is not dealing with the proper type of business or business man. This was emphasized when Commissioner Humphrey, at the Salt Lake City conference, said:

"If I say but one thing today that you remember, I want it to be this: that the Federal Trade Commission today is trying to protect the public from fraudulent and unfair practices; we are trying to protect honest business, because in protecting honest business we protect the public. Therefore, we contend that if a business is protected against fraudulent and unfair practices, then those who are far sighted enough to throw such safeguards around their business and that of their customers, are pretty good people to deal with."

Stabilization in the industry working under a code of trade practices

comes through the natural process of operating with the "lights turned on," with all concerned following the same prescribed lines. For instance let me cite the losses formerly sustained in our own particular group through the shipping of coal on consignment. This has been entirely eliminated and the industry has been stabilized to that extent, and the coal that was formerly thrown on the bargain counter is available for a purpose that will probably produce profit; at any rate the same coal is given its chance in the market along with other coal that is produced. Numerous other hurtful practices have been done away with.

The Harlan Coal Bureau was organized by members of the Harlan County Coal Operators' Association in February, 1929, when a code of trade practices was adopted, and I am firmly convinced that the experience of this bureau will justify the statement that "it can be done." No form of trade practice can be a success, however, if there is an individual in the group who is looking for some unfair advantage for himself or his company. This movement must be made up of men who are sincere in their effort to improve the conditions in their respective industries.

Whenever you find an industry, whether it be coal or what not, or a group of that industry that is lagging behind the procession, that cannot see any benefits to be derived from such a procedure, then you can bet your last nickel that someone somewhere is out for some advantage not enjoyed or possessed by his competitors. The honest business man is not looking for a dishonest advantage over any one.

My prediction is that it will only be a short time until the entire industry of the United States will be working under a code of trade practices, and until that time there is no practical way that I can see to stabilize it.

HERALDS Dawn of Stabilization

By JAMES L. DAVIDSON

Secretary
Alabama Mining Institute
Birmingham, Ala.

THE fair-trade practice code movement seems to me the most promising panacea for the ills of the coal industry that has been proposed. The old maxim that "competition is the life of trade" has proved, in many lines of business, "the death of trade," principally through the use of unfair trade practices, shortcuts in acquiring advantage over another engaged in the same kind of business, and particularly by reason of "unintelligent" competition (i.e., selling below cost of production in order to maintain output).

History teaches that no nation, institution, industry, or business can be carried on successfully, grow, prosper, or even live for any length of time, unless it be conducted ethically in every sense of the word. Therefore, the code of ethics, which is the "mudsills" of the fair-trade practice movement, has re-established and will maintain the good character and business integrity of all concerns obligating themselves to the observance of its provisions.

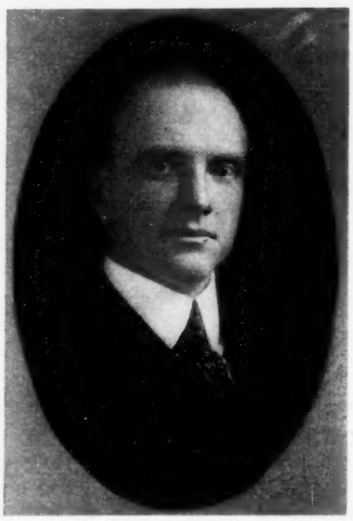
The beauty about the code of ethics and its main virtue is that, instead of leaving the determination of the right or wrong of any particular action in an "academic" state, so that each individual may set up his own standards of right or wrong business dealings; the code defines specifically and clearly what is "unfair trade practice," in clear, succinct and unmistakable language.

Many think that the code of ethics is the *sine qua non* of the fair-trade practice movement, but there is a great deal more than the code of ethics in this movement.

If I remember correctly, prior to the World War, all civilized nations of this earth practiced secret diplomacy and under-cover dealings one with the other, to the detriment of all. Then came the "open diplomacy," promulgated and insisted upon by Woodrow Wilson. This idealism, if we may term it so, has, during the intervening years, to some extent, been materialized to the great benefit of humanity.

Likewise, before the inauguration of the fair-trade practice movement, the people engaged in the coal industry particularly, and the purchasers of their products, were suspicious and distrustful, one of the other, and practically all dealings between the coal operators themselves and between the purchasers and producers of coal were at arm's length. Some of them wasted a lot of valuable time thinking up schemes "to run around" their neighbor on the one hand and to "beat" the seller on the other hand. Worst of all, the purchaser played one producer against another until the coal was procured; in many cases below the cost of production.

Under the fair-trade practice plan, "open diplomacy," we might say, is supreme. Snide practices have been abandoned, suspicion dissipated, unfair methods and means of procuring trade abandoned, confidence restored, claim jumping outlawed; and now the operators among themselves and with the purchasers can deal as man to man, four-square, and not as enemies at arm's length or with lances set, as was the case before the fair-practice code movement was inaugurated.



James L. Davidson

I wrote about a year ago as follows:

"Let us then face the future with expectant eyes and watch for the day of dawn of ethical conceptions of how this anemic industry should be nourished and encouraged and how its stunted stature may be started back to normal growth and plenteous prosperity, which will be reflected to the ultimate good of all concerned; not only the half a million people directly and incidentally dependent upon the industry for a living, but upon every citizen of this commonwealth and the government as well."

It seems to me that in the fair-trade practice movement a better day has dawned for the coal industry.

COAL INDUSTRY

+ Holds Its Own

Despite Rival Fuels

By R. DAWSON HALL

Engineering Editor, Coal Age

SUBSTITUTES in the present decade will fill the rôle in restricting the coal market that increased economy in use played in the decade just past. A few notes will be given in the accompanying article on the substitutes for coal and the effect they are likely to have on the coal industry, but one must not regard these rivals of coal too seriously. Indications seem to point to the fact that with all the competition of rival fuels and of water power the coal consumption last year was about the same as the year before.

Perhaps the most minatory substitute in the year 1930 will be natural gas. Though it has competed with the coal industry for years near its place of origin, it is only quite recently that pipe lines hundreds of miles long have been constructed to take the gas from state to state. In earlier years the cost of constructing adequate pipe lines and the pumping stations necessary for the operation of such gas mains was regarded as prohibitive. In fact the leakage of pipe joints was considerable. It made long lines a dubious investment. Welding has done much to make the lines strong and free from leaks.

But it is legislation above all that has made the owners of oil and gas territory interested in selling their gas. When prohibited from wasting it or from making a wasteful use of it, as in the manufacture of carbon black, which is a component part of automobile tires, inks, paints and electric carbons, no recourse appears to be left except to bring the gas to industry or industry to gas. This latter is too big a task to be accomplished speedily, so as time presses, gas is brought to industry.

For the map accompanying this article I am indebted to the *Standard Trade & Securities Service*, though some additions have been made to it based on a detailed wall map, published in the Aug. 29 issue of the *Oil and Gas Journal*. The following facts regarding expansion and statistics come from the former source and from an article which S. W. Meals read at the Natural Gas Department meeting of the American Gas Association in May, 1929.

The gas being piped will be used mainly for industrial purposes, as in most cases the natural-gas companies have no means of distributing their gas to domestic consumers. The case of Denver appears to be an exception. Moreover, when it is sold to gas companies for use in the home, as it probably will be eventually, it will change the specific gravity of the gas with which it is mixed. This will make trouble at the burners unless they are readjusted for the new specific gravity and unless the new gravity is made constant.

In considering the value of natural gas, it must be remembered that it varies in thermal value from 698 to 1,241 B.t.u. per cubic foot at 60 deg. F., according to the U. S. Bureau of Mines' pamphlet "Composition of the Natural Gas Used in Twenty-Five Cities," by G. A. Burrell and G. G. Oberfell. The average of the values is 987 B.t.u. The legal or franchise specifications usually require a heat content about half that, namely 530 B.t.u.

With prices at the well as low as to be almost negligible, it would seem that there would be no limit to the sale of a gas worth almost twice as much as the manufactured article. It must be remembered, however, that manufactured gas like coal does not cost as much as the public pays for it, in fact it costs only about 35 to 40c. a thousand cubic feet. More is often charged for distribution, taxes, etc., than for the gas itself.

When a charge of from 3½ to 17½c. per thousand cubic feet per 100 miles for transportation is added to the cost of natural gas—and those are the figures generally given—the cost of natural gas 1,000 miles from the well, at Chicago for instance, will run from 35c. to $1.75 above the well cost, and to that, distribution costs, in the case of domestic use, have to be added. Some say that even the lower figure, 35c., can be shaded somewhat, perhaps enough to pay for the gas at the well.

Lines are being built feverishly in many sections of the country, though it seems premature to imagine, as some enthusiasts do, that the mains will eventually reach Washington, Baltimore, Philadelphia, northern New Jersey and even New England States. The gas fields in Pennsylvania suggest that possibility, but the quantity of gas available in that area, depleted as it is already, is not enough to supply all the demands of the adjacent industrial region. For some time the lines will be run to the nearer markets. When they are exhausted it will be possible to consider what may be done beyond. It must be remembered that a pipe line 2,000 miles long with the necessary compression stations can pay for itself only after a long period of years, for it can carry no more gas than a shorter line.

For this reason a large producing area must be provided for a long line, which in turn involves a heavy capitalization.

In 1919, the natural-gas consumption was 746 billion cubic feet. In 1928, it was 1,567,870 million, or about twice as great. In the former year industrial uses took 66 per cent of the gas, but in 1928 the proportion had risen to 79.5 per cent. Only 20.5 per cent was used in the home and for miscellaneous purposes. The aggregate gross income of the entire gas industry, natural and manufactured, was $875,000,000 in 1928.

Without question natural gas will have a bad effect on the Colorado and Utah coal markets in 1930 and in Illinois and Indiana some time thereafter. The public welcomes it because it is smokeless. It is, however, an expensive fuel, not only because of the cost of the gas when brought from a great distance but also because, as frequently burned, the full value of its heating qualities is not obtained. Complete combustion is not the sole requisite. The heat must be taken from the burned gases or much of the heat will go up the chimney. The best method of making efficient use of the heat is by providing that it will be converted into radiant heat in the interior of the furnace, whereas in many gas furnaces an attempt is made to transfer the heat from the burned gas by a wholly inadequate system of flues.

THE number of house-heating installations burning manufactured gas installed in the season 1928-29 was 20.5 per cent greater than in the previous season. The number of natural-gas installations made during the same period, says *Heating and Ventilating*, Vol. 26, p. 77, was 15.7 per cent greater than during the previous period, making the number of gas heating installations made in 1928-29 greater by 19.5 per cent than in 1927-28. California led in its proportion of new central gas-heating installations, with 43 per cent of all those in the country; next came Ohio, with 16.7 per cent, and Oregon, with 12 per cent. Perhaps it is best to figure by the number of new installations per million persons. California and Oregon led with over 10,000 per million. Montana, Colorado, Missouri, Maryland, and Ohio come in another group, with 1,000 to 10,000 installations per million. The number of new installations in the season 1928-29 was: of natural gas, 65,402; of manufactured gas, 76,369, and of both, 141,771. This includes both boilers and furnaces and conversions of both from other forms of fuel.

Eventually, of course, the natural-gas lines will cease to have any gas to carry and where they cross coal fields they, if not corroded by that time, will be available for the transportation of gas manufactured from coal at the mines. But that day is a long way off and not considered by the present natural-gas pipe owners in their calculations. They provide as best they may for the future by reserve acreage, which adds heavily to the cost of the enterprise.

ANOTHER active competitor of coal is oil. Harry F. Tapp, executive secretary, Oil Heating Institute, New York, said that, judging by the sales in the first ten months of the year, the number of installations of domestic oil burners in 1929 was 125,000, about 25 per cent more than the year before. Altogether about 510,000 domestic oil burners have been installed up to the present, perhaps about 520,000. Mr. Tapp had cast out some as representing replacements.

Here, it may be interjected that these latter must cut quite a figure in calculating the number of equipments in actual operation. In some cases the purchasers have been so disgusted that they have thrown out their installations and gone back to coal. At one place a full third of the purchasers gave up their oil burners.

Two of a very few interviewed said they had each had three different installations, of which two were worthless and extravagant. A most significant statement was that they were entirely satisfied with the burners they are now using. One coal dealer in New England declared that he had noted many installations had become uncertain in operation and had been thrown out. Some persons have left their houses temporarily and come back to find the rooms filled with cobwebs of soot from imperfectly consumed oil.

Mr. Tapp estimated that each burner consumed 60 bbl., or 2,520 gal., per season. He put the price of the oil in the East at 7½c. a gallon and in the Middle West at about 6c. Thus the average cost of running a furnace for a year, without overhead charges, renewals, and repairs, would run from $151. to $252. Mr. Tapp declared that correctly designed machinery should last 10 to 15 years, and the tank if sunk in earth void of corrosive material such as ashes should last 20 years. Some have already been in service still longer.

The report of the U. S. Department of Commerce declared Dec. 26, 1929, that in the first ten months of the year 67,734 oil burners had been shipped to points in the United States by 50 manufacturers whose output constituted 60 per cent of that of the entire industry. These same manufacturers shipped 853 burners to Canada, but presumably Canada has its own makers of these facilities also, whose product will make inroads on the American coal trade.

The same department declared in its "National Survey of Fuel-Oil Distribution, 1928," prepared by E. B. Swanson, that railroad purchases were 67,435,495 bbl. in 1927 and 68,028,196 bbl. in 1928. Electric plants took a little more oil in 1928 than in the previous year, though the percentage of oil used for electric power plants had declined regularly and heavily since 1924. Bunkers and gas enterprises took less oil than in 1927. The reduction in bunker oil was largely because of the smaller intercoastal movement of petroleum and the resulting decreased use of bunker oil on company tankers.

ON JULY 1, 1928, there were 1,167 tankers, including vessels of less than 1,000 tons, of a gross rating of 6,544,263 tons, burning oil. A year later there were 1,236 tankers and their gross rating was 6,987,922 tons. At the earlier date similarly there were 3,706 trawlers and other fishing vessels, of an aggregate tonnage of 838,072, burning oil, and a year later 3,771 such vessels with a total tonnage of 859,940.

Similarly in that same period steamers fitted to burn oil fuel rose in number from 3,745 to 3,787 and in rating from 19,053,014 to 19,420,895 tons. Motorships also increased from 1,808 to 2,069 and their ratings from 5,153,116 to 6,343,056 tons. The figures are from Lloyd's Register of Shipping and its annual reports. Oil, therefore, up to July 1 of last year was making progress on the sea.

In 1928, says Mr. Swanson, 16,704,335 bbl. of oil was used for commercial heating as against 15,750,506 in 1927. Mr. Swanson divides the United States into seven parts, and in all but the Rocky Mountain and New England regions the use of oil increased. New England's figures are large enough to be significant though not as large as those

of the Pacific Coast region. New England used 2,941,778 bbl. in 1927 and in 1928 only 2,414,398. Perhaps the figures of the Middle Atlantic region should be given, as it is a prominent battleground between anthracite and oil. It increased its use of oil for commercial heating from 4,501,641 to 4,787,659 bbl.

In 1927 the oil consumption for domestic heating totaled 11,709,000 bbl. In the following year it was 13,967,000 bbl.

Each coal region believes itself more greatly plagued by oil burners than any other, so it is interesting to note that, according to *Heating and Ventilating,* August, 1929, p. 83, of the leaders Illinois has 21.6 per cent of the domestic oil burners; New York State, 13.7 per cent; Missouri, 12.9; Nebraska, 7.8; and Massachusetts and Minnesota, each, 5.39 per cent. New England has 11.04 per cent and New York, Pennsylvania, New Jersey, District of Columbia, Maryland and Delaware have in aggregate 22.48 per cent. Thus only a little over one-third of the domestic oil burners (33.52 per cent) are in territory in the immediate Pennsylvania anthracite radius. A large percentage, 42.32, are to be found in three central states, Illinois, Missouri and Nebraska, only one of which states produces oil. These figures are based on fuel-oil consumption and were prepared by the American Oil Burner Association.

Nebraska has the most oil burners per million of population—namely, 23,480. Rhode Island has 16,850; Missouri, 15,600; District of Columbia, 12,700; Illinois 12,590; Minnesota, 8,475; Massachusetts, 5,390; New York, 5,070; Indiana, 4,350; and Connecticut, 4,300 per million.

Another competitor is water power. In 1929, says *Electrical World,* 331,420 kva. of hydroelectric power was installed or scheduled for completion and 2,710,000 kva. of steam-generated power, the latter figure being 8.18 times as large as the former. Thus only about one-tenth of the entire newly installed power contemplates the use of water. When New York State can arrange to utilize its water powers and the United States can arrive at an agreement with Canada as to the power on the St. Lawrence River there may be, for a time at least, a realignment of the relative importance of the two sources of power as far as new development is concerned.

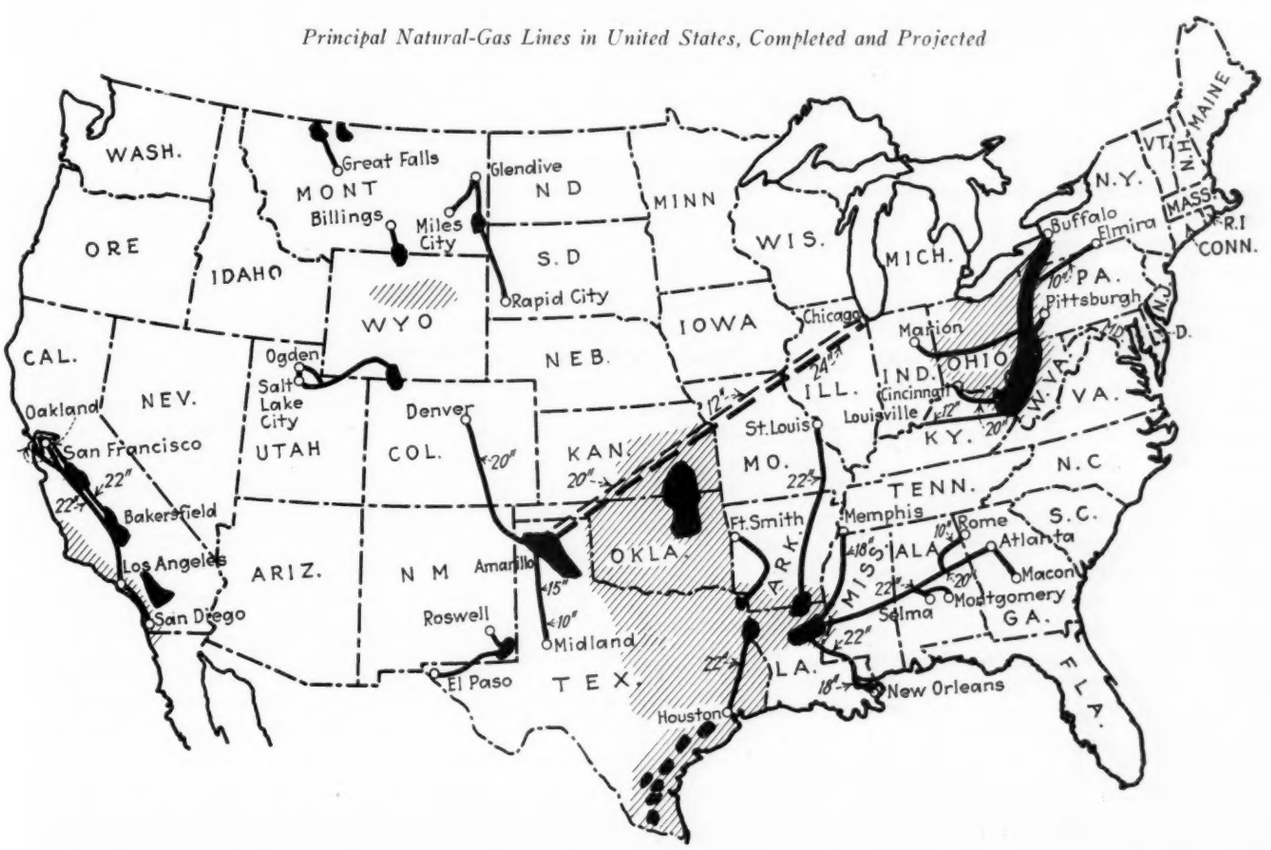
Having listed the rivals of coal and their inroads it is pertinent to discuss the possibilities of a bigger demand for fuel for power and heat. One of the important sources of greater demand is the growing population of the country. The population has increased by 14,299,000 persons in the last decade, according to the National Bureau of Economic Research.

Thus the increase is about 1,400,000 a year, which would demand at 5.04 tons per capita, which is about the present consumption, 7,056,000 tons of additional coal per year. Assuming that each domestic oil and natural-gas burner displaces 10 tons of coal and that there are 200,000 more of these in 1930 than in 1929, they will displace only 2,000,000 tons. The impact of industrial uses of natural gas probably will be more important. Nevertheless here is a countervailing factor of significance.

Another is the drift to cities from the country and therefore from wood-warmed and imperfectly coal-warmed homes to more adequately heated houses in urban areas. Improved heating in country houses is a third.

There are many opportunities to increase the use of fuel. It seems, perhaps, quixotic to suggest that stadiums should be heated to prevent the distress and pneumonia consequent on games such as the football contest between Notre Dame and the Army in New York this year, but in Stockholm the Swedes are expecting to heat a big stadium electrically, and the United States may be using steam

Principal Natural-Gas Lines in United States, Completed and Projected



for the same purpose before long.

Most hopeful of all signs is the silent progress of refrigeration for buildings, the future of which is in somewhat too conservative hands so far as advertising is concerned. If the oil- and gas-burner concerns had been as silent as the building refrigeration companies progress would have been nil.

The Carrier Engineering Corporation has kindly furnished a list of the outstanding installations they have made during the last two years. This list includes the Hotel Governor Clinton, R. H. Macy & Co.'s department store, the New York Trust Co., the Bank of the Manhattan Co., all in New York City; the Northern Trust Co. and the Chicago Title & Trust Co. in Chicago, and the San Francisco Stock Exchange.

Notable among its installations have been two in the Capitol Building at Washington, one for the U. S. Senate and the other for the House of Representatives. My informant says nothing as to the project reported in the papers that the reconditioning of the President's office in the White House shall include a plant for cooling the air.

AMONG important installations in the past two years has been that of the Wittenmeier Manufacturing Co. in the New Yorker Hotel, New York, one of the country's biggest hotels. Refrigeration and ventilation uses of power and incidentally of coal have the merit that they are the only uses that appear likely to help the summer load. All others either disregard seasons or lay stress on cold-weather conditions.

A somewhat wasteful form of warming buildings is electrical heating to which reference was made in the November, 1928, issue of *Coal Age*, p. 708, in which it was stated that in England department stores were being heated by electricity without any provision to store and thus make use of off-peak load.

The Hall Electric Heating Co., Philadelphia, Pa., has for two years been designing and installing electric heating equipment for buildings and for hot-water supply. It uses the patents of the General Electric Co. It believes that the electric light and power companies should first consider heating their own buildings and their own hot water by off-peak energy and it asserts that the actual cost per British thermal unit obtained from efficiently generated current is lower than with heat obtained by burning small quantities of coal in the small and relatively inefficient boilers installed for the heating of buildings.

Much interest has been evoked by the experiments of the Pittsburgh Coal Co. in the use of coal sludge for agriculture. The results of the experiment are given in percentages because, as the various products were hand-threshed, the actual yields would not mean much. They are given in the accompanying table.

Percentage Increase in Yield From Use of Sludge

	Wheat	Oats	Corn
Sludge plowed under....	0	0	0
Seed planted on sludge..	28	44	0
Sludge placed on seed...	0	33	0
Sludge mulched on top..	72	122	58
Untreated soil	0	0	0

In the opinion of those making this experiment it is important that the results obtained should not be regarded as conclusive evidence of the value of coal as a fertilizing or land-betterment agent. It still remains to be seen whether the second year's and succeeding growths are as good as the first year's, what is the optimum quantity per acre for any soil, whether indeed coal is helpful to all soils, and whether there is not something specifically valuable in the particular kind of coal used—namely, a sludge product which does not have the same chemical composition as crushed lump coal.

The effect of certain movements in coal consumption cannot well be gaged. For instance, will district heating result in a loss of heat in distribution and in excessive use greater than it will save in generation? Whatever is the answer it is certain that steam will put a crimp in the introduction of the oil furnace.

D. L. Gaskill, secretary-treasurer, National District Heating Association, Greenville, Ohio, says that there are 161 district-heating plants in the United States which are fully entitled to the name, and they have 79,212 customers. The amount invested in such plants is approximately $237,150,000. The gross income for the past fiscal year is $56,500,000, or nearly $707 per customer. The length of distribution mains is 4,332,745 ft., or about 817 miles.

These concerns sold in 1928 no less than 70,625 million pounds of steam. Mr. Gaskill says that the year 1928 saw about 10 per cent more steam sold than the year before and that from the present outlook extensions and new equipment approximating $40,000,000 will be made in 1930. The Edison Electric Illuminating Co. of Boston is putting in a large plant to supplement its power service, so that its customers will not have to maintain heating plants.

Due to conversion losses, low-temperature carbonization promises so large an increase in the tonnage of coal to produce a given quantity of heat that the coal operator is justified in aiding and advocating the further use of the process so long as he feels that the means used, one or all, are commercially justifiable. Granted that the low-temperature coke of domestic size obtained from processing coal weighs 60 per cent as much as the coal before treatment and that each ton of coal gives 3,500 cu.ft. of 900-B.t.u. gas for commercial use, the heat obtainable from the processing will be only about 70 per cent of the heat in the original coal.

Consequently about 1.43 tons of coal will be needed to afford the heat that can be obtained from 1 ton of raw coal. If the coal industry could treat all its soft coal by low-temperature carbonization methods it could find a market for 215,000,000 more tons of coal annually. Of course, that is an impracticable suggestion, but it shows what great possibilities are bound up in low-temperature methods.

ONE of the early events of the year was the starting of the K.S.G. plant at New Brunswick, N. J. Also early in the year a plant was opened at Lehigh, N. D., for the conversion of lignite into char and its briquetting. The Carbocite plant at Philo, Ohio, and the Coal Carbonization Co.'s plant at Moundsville, both produced low-temperature products during the year. The Milwaukee plant with its McEwen-Runge process operated part of the time.

A char briquet with about 12 per cent of volatile matter and weighing 45 to 50 lb. per cubic foot, as against 28 to the cubic foot for coke, is being made by the Supercoke Corporation at Chicago. The process was formerly conducted by the Illinois Anthracite Corporation at Farmersburg, Ind., on a basis of 100 tons of of throughput in 24 hours.

Comment has been made on the inadequacy of gas supplies in the Pennsylvania fields for the vast area around these fields and eastward. It is interesting that the Pittsburgh & Erie Coal Co. is about to put at one of its mines a complete gasification process, but without any intention perhaps of doing any more than catering to a limited local market.

MECHANIZATION

+ Progress Still Spotty

CONSIDERING the industry as a whole, the progress during 1929 in underground mechanization of face operations, all factors taken into account, was only partly satisfactory. An analysis of mechanization development geographically discloses the fact that, as usual, some states and fields have made more progress than others. Those mining areas that got away to an early start in the introduction of loading machines continue to lead in the increase of mechanically loaded tonnage and also lead the way generally in technical and managerial advances. Others follow roughly in positions established earlier in the race. Dead spots there are, but not in every case do these exist because of the machine-unmindedness of the operator so much as by reason of circumstances out of his control. The number of those producers who refuse to take stock in the extension of mechanized operations underground has not dwindled to any noticeable extent.

From the standpoint of tonnage handled by machines in the loading operation, Illinois improved its position more than did any other state. Though, in 1928, according to figures of the Bureau of Mines, Illinois loaded only 13.3 per cent of its production by machines of various types, machines were used in 1929 in the loading of 40 to 50 per cent of the total output, the latter being the estimate of J. D. Zook, commissioner, Illinois Coal Operators' Labor Association. The introduction of pit-car loaders in large numbers was chiefly responsible for this great growth. The same influence added considerably to the tonnage of coal loaded mechanically in Indiana last year.

To the bituminous fields of Pennsylvania goes the credit for the most open-mindedness in the trial and use of equipment for loading and allied operations. In the mines of this state are installed almost all types of machine, including a few untried in other fields. Loading machines, pit-car loaders, conveyors of various types, and scrapers are in the list of loading equipment in use. One reason for this wide scope of equipment can be laid to diffierences in the thickness of seams and to other natural conditions. The use of so great a variety of devices must also be interpreted to mean that many of the operators have not yet determined what equipment is best suited to the conditions in their mines. To substantiate this observation is the fact that the rate of increase in machine-loaded coal was not nearly so great for 1929 as that of Illinois, where the equipment trend has a more definite direction.

Cutting Machines of This Type Are Gaining in Favor

In the anthracite region signs are encouraging for a more general resorting to mechanical mining. The production of mechanically handled coal in this region has hitherto been chiefly by scrapers, but during the last year conveyors considerably augmented these tonnages. A limited number of shaker conveyors were utilized in backfilling with sufficient success to warrant the expectation that their use for this purpose will grow. Last year the anthracite industry absorbed not a few bituminous operating men. They have taken with them their soft-coal practices and have endeavored with some success to apply them to anthracite mining. Their biggest idea perhaps is the cutting of coal by machine, which has been tried but not yet found practicable in anthracite experience.

As a whole, mechanization made slow progress last year in West Virginia. Apparently it suffered because mechanical cleaning is occupy-

ing the center of the stage. In the northern portion, where until recently machine loading was neglected, there has been an awakening of interest. Kentucky, Virginia and Tennessee practically stood still, but in Alabama some progress was made in developing a new technique. Maryland's interest remained in the application of conveyors to the Tyson seam and to improvements in the timbering methods by which coal can be retrived from the Georges Creek seam. Ohio, as a state, continued backward. In Arkansas, Oklahoma and Iowa the chief interest has lain in the effective use of conveyors and steel roof supports in longwall workings. In none of these states has the increase of tonnage been large, compared to that of Illinois.

Loading Machines Are Doing Better

Of the Rocky Mountain states, Wyoming heads the list under the company leadership of Union Pacific, which in 1929 loaded more than 50 per cent of its output by machines, and the Sheridan-Wyoming Coal Co., which loads no coal except with the aid of machinery. These states as a group have maintained their gait in mechanization. Colorado operators, menaced by the introduction of natural gas, have been showing a burst of spirit. Montana and Utah have been active in mechanization; New Mexico has been relatively lukewarm.

The year 1929 marks the beginning of the widespread introduction of pit-car loaders. In Illinois over 1,700 units are installed; quite a few have been put into service in Indiana; a number of operators in western Pennsylvania, too, introduced this machine type last year. The Pittsburgh Coal Co. is now operating over 150 of these machines, according to reports. Recently, the George F. Lee Coal Co., an anthracite producer, adopted the pit-car loader for experimental purposes. This mechanism also is being tried in other states, notably in West Virginia. But only in the Midwest mines can it be said that the operation of this device has been developed into a regional practice.

Pit-car loaders have been installed under a wide variety of conditions and circumstances in practically every major coal field in the country. But not everywhere are they doing as well as they might if their operation were better planned and supported. Of the unfavorable reports received covering installations made in the past year, some ascribe their failures to unfavorable conditions and others to the fact that labor will not concede a differential large enough to justify the installation and use of such loaders. In relatively few instances are these machines producing as large a tonnage per man or per shift as might be anticipated, the average lying somewhere between 15 and 20 tons per man-shift. Whatever may be the opinions of the users, these two facts must not be overlooked: first, that the machine is a newcomer, operation of which requires some considerable measure of experience before its benefits can be most fully realized; second, that many of those who have installed this machine have no mechanical-loading background.

According to a recent count, sixteen manufacturers are now building pit-car loaders. Types range from the simplest of mechanisms costing considerably less than a thousand dollars to the more elaborate units quoted at several thousand dollars. Permissible electrical equipment is optional with some of them.

Something new in the field of loading devices is the development of units which are a cross between the pit-car loader at the one extreme and the heavy loading machine at the other. Much effort is being expended in more than one quarter toward the design of a chassis not much heavier than a pit-car loader, incorporating a loading or gathering head similar to that found on the true type of mechanical loader. The Lang loader, furnished by the Charleroi Iron Works, Charleroi, Pa., described in the September issue of *Coal Age*, page 534, is an example of this development, as its primary function and weight are approximately those of the pit-car loader. Its resemblance to a loading machine is in the digging head and in the propelling and feeding mechanism.

With the exception of the MacEachen loader, also described in the article in *Coal Age* already referred to, and the Whamond loading machine, developed at the mines of the Allegheny River Coal Mining Co., Kittanning, Pa., no new types of loading machines have been brought to light. Existing types, however, have been strengthened and improved, chiefly in the matter of permissible equipment.

That the technical advances in the operation of loading coal by the heavy automatic machines in the past year were marked is adduced by the fact that the average tonnage per machine shift, with a lessening in the number of men on the attending crew, showed a gratifying increase. In 1928 the majority of successfully installed machines loaded in thick coal from 200 to 250 tons per shift. In 1929 their output ran from 250 to 300 tons and in some instances even these figures were greatly exceeded, in a few cases they were almost doubled.

Conveyors are being built to better design than they were a year or two ago. Improvements of the past year are concerned chiefly with details which give durability, portability and simplicity of installation to these units. Perhaps the greatest betterment is found in drives, running gear, alignment features, and

materials used. Drag and belt conveyors show less tendency to foul, slip or catch, and shaker conveyors move the coal more positively yet without hazard to the driving and bearing elements. Improvements in this last type of conveyor are in the drives, pan joints and pan suspensions or supports. The use of metal mat face conveyors is growing.

Conveyor mining has not suffered to the gain of machine loading, for each of these two operations seems to have found its field. The success of conveyor mining in the room-and-pillar system in central Pennsylvania and in the longwall in the Paris basin of Arkansas is encouraging the greater use of conveyors elsewhere.

The pneumatic pick, an implement used in Europe for many years, has recently been added to the list of aids to mechanization. Experiments are now being made as to the possibility of its being used successfully, for the snubbing of coal in the Pittsburgh seam prior to machine loading, in which use it is said to be highly satisfactory, snubbing a cut 18 ft. wide in 7 to 10 minutes. It is also being used in the same seam for taking down drawslate, but its utility for this class of work is as yet undetermined. In central Pennsylvania, experiments are being made in its use for digging coal off the solid where conditions are such as to make difficult or impracticable the use of cutting machines. It is being used in Alabama for the mining of thin seams.

This implement in itself gives promise of aiding safety by stimulating the use of air as a motive power underground. For its use air must be piped to the working places. Thus it will encourage the use of pneumatic drills, of jackhammers for lifting bottom and brushing top, and of paving breakers for digging ditches.

Compressed air has been quietly at work in two unusual applications to underground machinery. One is in the driving of conveyors at the Ehrenfeld mine of the Pennsylvania Coal & Coke Corporation, in central Pennsylvania (see December issue, *Coal Age,* p. 737), and the other in driving Jeffrey chain-type cutting machines in a northern West Virginia mine. In both instances the use of compressed air has been reported as being economical, from the standpoint of safety if for no other reason.

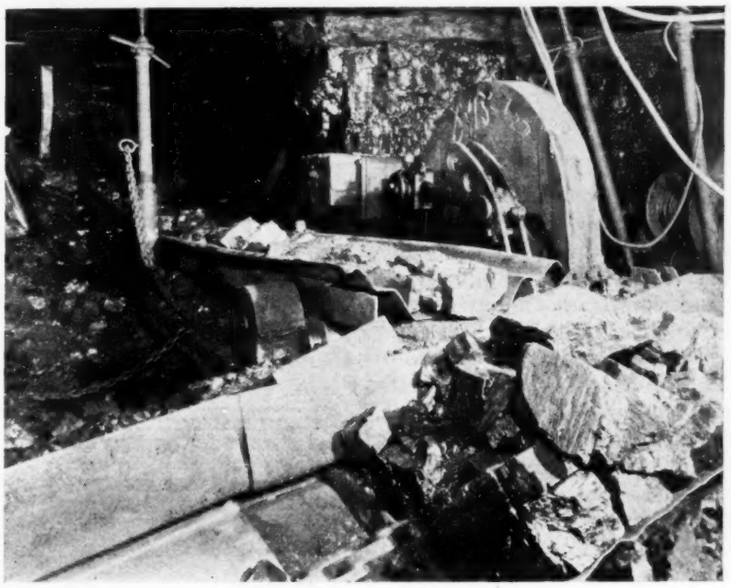
Track-mounted cutting machines continued to grow in favor during the past year. Led by its property-wide installation in the workings of the Island Creek Coal Co., West Virginia, these machines are winning their way into the thick beds in Illinois and Pennsylvania. As top cutters, they have been in use in Kentucky for a number of years. Now they are being built to cut at any elevation within the limits of the coal beds or as a combination horizontal cutting and shearing machine.

The approach to complete mechanization is teaching the operator many facts he failed to appreciate in the earlier stages of the development. Chief among these is the fact that the first cost of loading devices represents less than half the total expenditure actually required. Changes must be made in the direction of personnel in layout, in the transportation system; additions must be made to the accessory equipment; changes must be made in the capacity of cars and shaft hoisting must be speeded up or production curtailed, for the reason that a car holding 3 tons when loaded by hand will not accommodate that much when machine loaded. Reconstruction of surface structures involving amplification of preparation facilities also is necessary.

More caution might be exercised in holding that safety is synonymous with mechanization. On many occasions in the past year accident rates on the basis of tonnage produced were displayed as the yardstick of safety in mechanization. There are those who assert that the rates should be based on man-hour exposure rather than on tonnage. Eugene McAuliffe, president of the Union Pacific Coal Co., thinks in the latter terms. A. D. Lewis, former director of the Department of Mines and Minerals of Illinois, made the statement before the fall meeting of the Illinois Mining Institute that the records of Illinois would seem to show that mechanization has increased the accident rate based on the number of men employed.

From recent indications mechanization is acting as a spur to the use of permissible equipment. The feature is frequently quoted as an option when loading machines, conveyors and pit-car loaders are sold. It is listed as a standard in the 7 B U Joy loader. Mass production of permissible equipment is lowering its cost. This tendency is already noticeable in the case of the pit-car loader.

Multiple shifting will bring a new era in mechanization. Perhaps no other phase of the subject is receiving more attention from the bigger companies. The H. C. Frick Coke Co. has been multiple shifting a number of its oldest mines for years (see *Coal Age,* December issue, p. 752) and the results are said to be highly satisfactory. Multiple shifting is common practice in European mines. The heavy investments required for complete mechanization cannot bring an adequate return without it. Mechanical cleaning as a complement to mechanized mining further emphasizes its necessity.



Conveyor Mining Is Increasing

WAR AGAINST ACCIDENTS

+ On Wide-Flung Front

By W. W. ADAMS

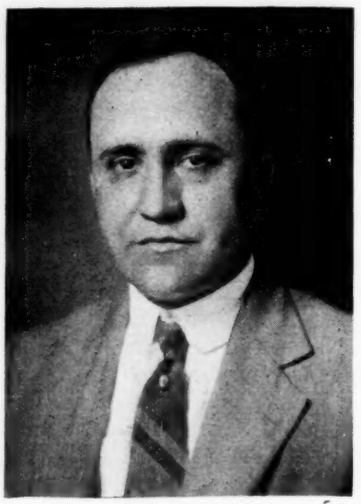
Supervising Statistician
Accident Statistics Section
U. S. Bureau of Mines
Washington, D. C.

THE CONSTANT CAMPAIGN for safety in coal mines resembles in some respects the operations on the western front during the World War. Progress into enemy territory is not uninterrupted, nor is it always simultaneous along the full length of the line. Some of the sectors of the coal-mine battle front lost ground in 1929 while others made more or less progress. The net result of the year's operations was a slight gain, as far as may be determined from information available shortly before the close of the year.

It would be fortunate indeed if the whole line could advance at one time and if ground once gained could be held permanently. But the history of the campaign from its beginning many years ago is a story of a continually moving line whose parts seldom move in unison nor indeed always in the same direction at the same time. The line as a whole has advanced from positions which it occupied in earlier years, but it has not yet registered the gains which might be hoped for.

While only tentative figures are available now, indications are that casualties last year will include 2,186 deaths, or 10 more than the number shown by final figures for the previous year. This figure is based on reports for eleven months, allowing for usual corrections, plus an estimate for December based upon that month's record of a year ago. The additional 10 fatalities will not cause an increase in the death rate per million tons of coal produced, because there was a much larger proportionate increase in the year's production. The fatality rate was 3.65 for each million tons of coal produced, as compared with the preceding year's rate of 3.78.

It is too early to determine the death rate per thousand men employed; that rate will not be known until all companies have reported to the Bureau of Mines the number of men they employed last year, which will hardly be before August or September of the present year. However, unless some material change occurred in the average daily productivity per man from the amount shown in the previous year, it is probable that the year 1929 will show a small reduction in the death rate per thousand 300-day workers as well as per million tons of coal produced.



W. W. Adams

No one knows how many nonfatal injuries occurred, because a complete record of them is not kept; but it is known that for every fatality there are not less than 50 injuries causing disability for one day or more. On this basis it is estimated that at least one hundred thousand persons were injured. The average injury represents a loss of 15 days. Therefore the injuries which occurred last year represent at least one and one-half million days of disability. That was the "healing period"—the amount of time required for the injuries to heal sufficiently for the men to return to work. Lacking reports for injuries, the past year may best be judged by its record of fatal accidents alone.

REVERTING to the simile of a battle line, there are seven principal sectors; these take their names from the types of hazard which they have to overcome. The main sector is falls of roof and coal, which normally occupies about half of the entire line, its allotment usually being 48 per cent or thereabouts, although its exact measurement varies from year to year; in 1929 it amounted to 54 per cent. This particular sector lost 1,176 men last year, the death rate being 1.97, or 6 per cent higher than that of the previous year.

On the haulage sector, which com-

prises 17 or 18 per cent of the line, the fatalities numbered 398 and represented a rate of 0.67 as compared with 0.63.

One sector which is exceedingly important on account of the sudden and surprising actions of the enemy is the major-explosion sector. This part of the front usually is quiet, but its occasional activity results sometimes in heavy losses. Six instances in which this front was active last year resulted in a loss of 147 lives, indicating a death rate of 0.25, which, however, regrettable, represented an improvement over the experience of the previous year, when the death rate was 0.57.

A smaller portion of the line, known as the local or minor-explosion sector, reported 48 deaths last year, with a rate of 0.08, as compared with 0.09, this also being one of the sectors which made progress during the year. The combined frontage of the two explosion sectors was only 9 per cent of the line in 1929, although its usual frontage over a period of years is about 13 per cent, of which 9 per cent usually represents the major-explosion sector and 4 per cent the local-explosion sector.

THE explosives sector, occupying 4 per cent of the line, reported 93 deaths as a result of the year's operations; this figure represented a death rate of 0.16, which was a less favorable record than that represented by the previous year's rate of 0.13. Four per cent of the line is held by the electricity sector, whose losses last year were 81 lives, representing a death rate of 0.14, a slight improvement as compared with the rate of 0.15 for the preceding year. The miscellaneous sector usually occupies 11 to 13 per cent of the line, and its losses last year reached 243 fatalities with a death rate of 0.41, as compared with 0.36 for the year before.

A general picture of the results of last year's campaign is all that can be safely given at this time. Indeed even if it were possible to speak in more detail, it might not be advisable to do so, because of a natural tendency to attach too much significance to a single year's activities. It is particularly inadvisable to judge the accomplishments of a single state on the basis of one year's experience, especially if the state be only a small producer of coal.

Comparative records covering the years 1924 to 1928 show that certain states have been notably successful in the prevention of accidents. During these years the fatality rate for underground accidents in all coal mines in the United States was 2.152 per million man-hours of exposure to underground hazards.

ACCEPTING this average as a fair basis for comparison, the records show that some states, including several of the large coal producers, have had safety records which were much better than the country's average. These states are now producing considerably more than half (about 60 per cent) of the country's yearly tonnage of coal. Among these states are Illinois, Pennsylvania (bituminous), Pennsylvania (anthracite), and Kentucky, whose records were, respectively, 25 per cent, 21 per cent, 14 per cent, and 9 per cent better than the average for the whole country.

Other states whose fatality rates were also lower than the country's average are Ohio, North Dakota, Missouri, Iowa, Maryland, Michigan, Kansas, and Texas. Three states whose fatality rates were only slightly higher than that for the country as a whole were Tennessee, Alabama, and Virginia, whose rates were not more than 3 per cent higher than the general average.

When we consider the several types of accidents the states assume a somewhat different alignment. The five-year average death rate for falls of roof and coal was 1.093 per thousand man-hours of exposure underground. Pennsylvania and Illinois, two large coal-producing states, had such low rates from this class of accidents as to place those States in the front ranks.

Associated with Pennsylvania and Illinois were North Dakota, Iowa, Indiana, Alabama, Maryland, Missouri, Tennessee, Kansas, Michigan, and Texas. Following just after these came Oklahoma and Kentucky, whose respective fatality rates from falls of roof and coal were just 2 per cent and 4 per cent higher than the average for the United States.

The falls-of-roof problem is the most difficult one with which the mining industry has to deal. Its solution is largely dependent on the education of more than 400,000 men. These men are the miners, loaders, machine men and others who are employed at the "working face" of the coal seams where nearly all of the accidents from falls of roof occur.

To inculcate the spirit of safety into so large an army of men, scattered at the working faces of seven thousand coal mines, is no slight task, nor is the task facilitated by the customs and habits which have so long been associated with the miner in his work. Human nature is much the same wherever we find it, whether in the miner working alone in the dim light of his room underground or in the driver of an automobile on the sunny streets and highways of the country; the disposition to act safely must be so developed as to become second nature.

Until that stage is reached by most of the miners, only meager progress in the prevention of accidents from falls of roof and coal may be expected, in spite of all admonition and safety instruction which the men may receive from the supervisory officials of the mines. Some progress may be made if foremen and superintendents who instruct the miners to make their working places safe can and will stand by until their instructions are complied with; but unless they are able and willing to do this, it should not be surprising that many of the 400,000 miners will not act upon the safety instructions which they receive.

Like the man who disregarded a "No Smoking" sign in a powder factory because it did not say "positively," many miners do not think that the foreman means "positively" unless he remains on the spot until his instructions are obeyed. Experienced miners doubtless feel that they know how to keep their working places safe without the advice of the foreman, but until they develop the rare quality that habitually leads them to act upon their knowledge, they will needlessly become the victims of this principal hazard of coal mining.

FOREMEN will continue to lose their men from the same hazard until they, the foremen, in larger numbers than at present, acquire and act upon the knowledge that the prevention of accidents from falls of roof is a matter that cannot be left entirely in the hands of the miners themselves. The foremen should show that they mean "positively" when they give orders to miners to make their working places safe.

Haulage accidents, as previously stated, were responsible for 398 deaths last year among underground employees in coal mines. The death rate, indicated by reports now available, was 0.67 per million tons. Unless later returns require a revision of this figure, the rate will stand about 6 per cent higher than the previous year's rate. As records for recent years have indicated an upward

trend in the annual death rates from haulage accidents, it would be well if all operating companies gave special heed to haulage conditions in their mines, so that the upward trend might be stopped without delay.

States whose fatality rates from haulage accidents during 1924 to 1928 were relatively favorable were Ohio, Illinois, Tennessee, North Dakota, Oklahoma, Arkansas, Pennsylvania (both anthracite and bituminous), Iowa, Missouri, Texas and Kansas. These States produce about half of the country's yearly output of coal. The fatality rate for Indiana was the same as that for the United States. The rates for Kentucky and Alabama were only 1 per cent higher.

EXPLOSIONS of gas and coal dust usually rank third among the principal causes of fatal accidents in coal mines. They would rank fifth, and the country's yearly death toll would be greatly reduced, if it were not for the occurrence of major explosions—those which kill five or more men. If rock dust and other known methods of prevention were universally applied, it is probable that major explosions would no longer occur and that nearly 10 per cent of the country's annual loss of life in coal mines would be prevented.

The failure of many mines to adopt methods which have been proved effective in the prevention of major explosions not only increases the explosion hazard due to ignition from open lights but also from explosives and electricity, those two agencies of efficiency which have helped to place the United States ahead of all nations in the quantity of coal which it is possible for the average employee to produce in a day's work. The removal of the explosion hazard would go far toward increasing the assurance of safety in the use of explosives and electricity.

Six major explosions last year resulted in 147 deaths and brought the total number of fatalities from both major and local explosions to 195, representing a death rate of 0.33 per million tons as compared with 0.65 for the previous year. The major-explosion rate was 0.25, indicating a gratifying reduction from the previous year's rate of 0.57. The local-explosion rate was 0.08 per million tons as compared with 0.09 for 1928. Two of the six major explosions were at mines in Oklahoma and caused the death of 70 men. One explosion in Pennsylvania killed 46 men; one in West Virginia, 14 men; one in Alabama, 10 men, and one in Illinois, 7 men.

The fatality rate from gas and dust explosions in all coal mines in the United States during the years 1924 to 1928 was 0.378 per million man-hours of exposure underground. Some states suffered no loss of life from explosions. Other states, which had one or more deaths from this cause but whose fatality rates were lower and better than the average for the country, were Ohio, Virginia, Iowa, Kansas, Pennsylvania (anthracite), Kentucky, Colorado, Illinois, and Pennsylvania (bituminous).

THE three outstanding causes of coal-mine fatalities—falls of roof and coal, haulage, and explosions of gas or dust—accounted for 81 per cent of all fatal accidents in 1929. Accidents from all other causes resulted in 417 fatalities and represented a death rate of 0.70 per million tons as compared with 0.64 for 1928. Included in the 417 accidents from miscellaneous causes were 93 fatalities from explosives, the death rate being 0.16 per million tons as against 0.13 a year ago, and 81 fatalities from electricity, indicating a rate of 0.14 per million tons as compared with 0.15 for the previous year.

During the five years 1924 to 1928 the fatality rate for all accidents due to these miscellaneous causes was 0.315 per million man-hours of exposure underground. The following states, however, had better safety records for accidents from miscellaneous causes than the average for the country as a whole: Texas, Maryland, Pennsylvania (bituminous), Illinois, Wyoming, New Mexico, Kentucky, Virginia, Iowa, Kansas, Utah, and Indiana.

The foregoing comparisons of the death rates for individual states are based upon records for the years 1924 to 1928 because that is the latest five-year period for which figures showing man-hours are available. Such figures for 1929 will not become obtainable for several months. However, similar records covering several five-year periods in the past have indicated that the line-up of states is only slightly affected by a single year's fatality record.

Modern methods and equipment have made it possible to produce a given quantity of work with fewer men and a smaller actual loss of life than was possible in former years when more primitive methods and equipment were used. The smaller loss of life, however, may conceivably become heavier in proportion to the number of men engaged than was the case when more men were killed and more men were employed.

The great object of safety work, of course, is to reduce the actual number of lives lost, an accomplishment which has been achieved at many mines in recent years, but it is also essential that the smaller number of men required to do the work with modern equipment should have their occupations made safer so that they as individuals and as a group may have a more favorable life-expectancy than their predecessors had. The slogan should be: "More coal per death and fewer deaths per thousand men employed."

HOW to accomplish this dual objective is one of the most perplexing problems which confronts the coal-mining industry today. It is a problem which may well engage the attention of the best minds that the industry can employ. The nation at large is benefited when the death rate per ton is reduced or when there is a reduction in the actual number of lives lost, but the miner's job has not been made safer for him personally unless the death rate per thousand men employed is reduced. Until this rate declines, the miner's personal application for a life insurance policy remains as unacceptable as ever to an insurance company, no matter how much the death rate per million tons is reduced.

Thirty years ago the United States, by surpassing Great Britain, became the world's largest producer of coal. That position we still hold. We have also an unquestioned leadership in the average productivity per employee per day, due to a fortunate combination of favorable natural conditions in the mines plus the extensive use of modern machinery. Is there any insurmountable obstacle to our achievement of world leadership by establishing the world's lowest accident rate, both per ton and per man employed? The industry's past record in overcoming obstacles is the most emphatic answer to the question. Such leadership can certainly be attained. There can be but one real question: When will the goal be reached? The answer is: When the "safety consciousness" which now characterizes the work of many of the leading coal-producing companies has spread its contagion to the relatively small percentage of companies that are the chief contributors to the industry's yearly accident toll.

"HARD COALS"

+ Outside of Pennsylvania Make Consistent Gains*

Where Arkansas Anthracite Goes

By O. E. KIESSLING

Associate Mineral Economist
U. S. Bureau of Mines

TO MOST PEOPLE, including those familiar with the coal trade, the term "anthracite" ordinarily denotes hard coal produced in the northeastern counties of Pennsylvania. Even some close observers are not generally aware that a considerable tonnage of coal of anthracitic and semianthracitic[1] qualities is produced outside of Pennsylvania—and that the volume of this production has been steadily increasing. Such coals are commercially produced in the Crested Butte field of Colorado, the Los Cerrillos of New Mexico, in the Spadra and Russellville districts of Arkansas, and in that portion of the Valley coal fields of Virginia lying in Montgomery and Pulaski counties.

From 363,324 net tons in 1913, the production of hard coal outside of Pennsylvania practically doubled in the sixteen years through 1928. While output showed large gains beginning in 1916 and extending through the war period, further expansion occurred during the post-war years—an indication of the stable character of the new demand. This record of gradual growth over an extended period is especially significant when it is compared with other branches of the coal industry that have either lost volume or barely remained stationary since 1913.

To make comparisons easier, the figures of production are reduced to index numbers in Table II, taking the year 1913 as 100. It will be seen that the output of Pennsylvania anthracite was 18 per cent less in 1928 than in 1913, and that over the same period the production of bituminous coal increased only 5 per cent. The production of all other hard coal outside of Pennsylvania, on the contrary, increased 96 per cent; and if the years 1925 and 1926, when demand was unusually stimulated by the long Pennsylvania suspension, are taken, the increases are 117 and 132 per cent, respectively. In only two periods—1914 and 1922—has production gone below the 1913 level; and in the latter of these two years the disturbing factor was labor difficulties.

The relative increase in the production of "other hard coal" is correlated with a large increase in the average value[2] per net ton received at the mine. For example, the $4.19 per ton obtained in 1928 represents a gain of approximately 62 per cent over the $2.58 for 1913. In general, values reached their highest levels from 1919 to 1923, with averages ranging from $4.91 to $5.75. The years 1924 to 1928, with average values from $4.19 to $4.70, marked a recession in prices, partly due to the nationwide depression in the coal market. The effect of this price recession, however, was partly offset by the increased production in the later years.

In contrast to the downward trend of average realizations on bituminous coal since 1920, the average values on all hard coal mined outside of Pennsylvania, while tending downward since 1922, have remained more

*Published by permission of the Director, U. S. Bureau of Mines. (Not subject to copyright.)

[1]In this discussion the ranks given coals under the system of classification adopted by the United States Geological Survey a number of years ago are taken as guides. According to the method employed by the Survey, anthracite is defined "as hard coal having a fuel ratio (fixed carbon divided by the volatile matter) of not more than 50 or 60 and not less than 10," while the fuel ratio for semi-anthracite (with some modifications) ranges from 6 to 10. Since this study covers the commercial production of coals outside of Pennsylvania which range in fuel ratios from 6.3 to 39.1, it includes those classified either as anthracite or semianthracite by the United States Geological Survey. See Campbell, "The Coal Fields of the United States," U. S. Geological Survey Professional Paper 100-A, pp. 27-28, 30; and Campbell and others, "The Valley Coal Fields of Virginia," Bulletin XXV, Virginia Geological Survey, pp. 115, 126.

[2]Excludes selling expense.

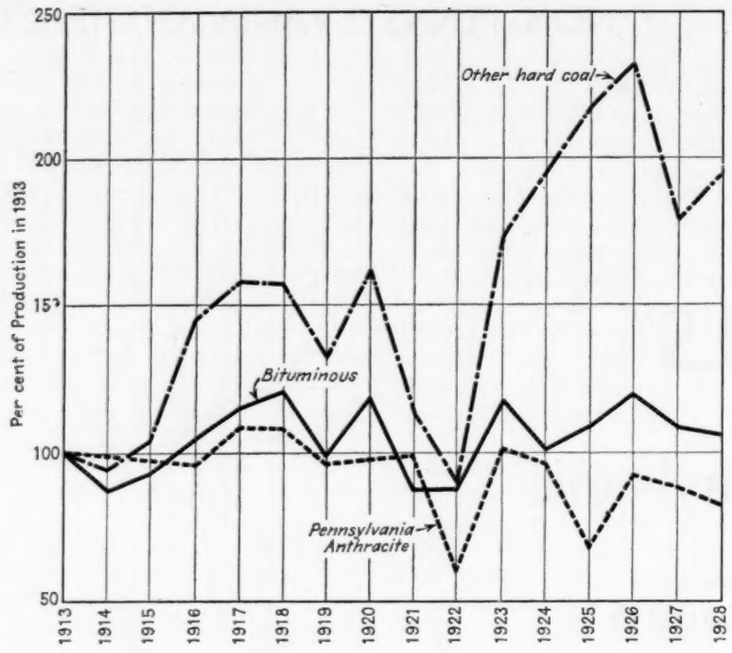


Fig. 1—Relative Rates of Growth of Bituminous Coal, Pennsylvania Anthracite, and Other Hard Coals in the United States

in accord with the higher prices obtained for Pennsylvania anthracite (Fig. 2). Considering only average values, it is clear that all other hard coal has suffered relatively less from the depressed character of the coal market since 1923 than has bituminous coal. Since 1921, a fairly constant differential of more than $2 has been maintained between the two fuels.

In connection with the higher sales realization on other hard coal in comparison with bituminous coal, it should be remembered that the former is produced under more difficult conditions of mining than those prevailing in any of the large bituminous fields. These physical handicaps are reflected in the average daily production per man, which in 1928 was less than one-half the average daily output per worker in the bituminous industry.

Throughout the sixteen years under consideration, the average values obtained for other hard coal have been within reasonable distance of those received for Pennsylvania anthracite, as shown in Fig. 2. For the first ten years, through 1922, the curve showing the average values of the former is the higher, representing a differential ranging from a few cents to about $1. Beginning with 1923, the position of the curves is reversed, and since that year the curve for Pennsylvania anthracite has been the higher. It should be noted that these average values include all sizes—screenings, mine-run, and other steam grades, as well as prepared sizes. Also, for purposes of comparability, the average values of Pennsylvania anthracite have been converted from a gross to a net ton basis.

In comparing sales realizations of Pennsylvania anthracite with those obtained for hard coal mined outside of Pennsylvania, differences in cost of production are an important consideration. During the past five years the labor cost, which accounts for about 70 per cent of the cost of coal[3] has been generally higher in the Pennsylvania region than in the other hard coal fields. In the former area, the union miners received a 10 per cent increase in wages in September, 1923, and the scale thus established was continued until 1930 by an agreement signed in 1926. Wages in the other hard-coal fields have followed the course of wages of bituminous miners in the respective states. In general, the tendency has been toward reduction, particularly since 1926.

Because the commercial developments are widely scattered and because of differences in operating and marketing problems among the four principal areas, there is no recognizable unity or community of interests in the hard-coal industry outside of Pennsylvania. Operators in any one of the districts may experience prosperity or depression due to conditions which may only distantly affect producers in the other three areas. While it is true that all of the districts shared in the growth of demand for high-quality domestic fuels, the relative proportion of gain for each district has varied. For example, between 1913 and 1928 the production of "Virginia anthracite" increased 215 per cent, "Arkansas anthracite" 72 per cent, and "Colorado anthracite" 45 per cent.[4] Over the same period average values per net ton for these coals increased 81 per cent, 75 per cent, and 43 per cent, respectively. "New Mexico anthracite" also showed increases in output and value of product.

Unfortunately, data are not available which will allow a complete differentiation of figures for each of the four districts. A useful analysis, however, can be made by separating the available statistics into two main divisions: The eastern region, which consists of the operations in Virginia; and the western region, which includes operations in Arkansas, Colorado, and New Mexico.[5] Such a

[3]Report of U. S. Coal Commission, Part I, page 7.

[4]It should be noted that the relative increases in production do not adequately indicate the tonnages involved. The increase of 72 per cent for Arkansas represented twice as much actual tonnage as the combined gain for New Mexico and Colorado; and in 1928 Virginia and Arkansas produced more than 75 per cent of the output.

[5]With regard to this latter group, a more useful separation would place Arkansas in one division, and both Colorado and New Mexico in another. Data necessary to make an analysis on this basis, however, are not available.

Table I—Production and Average Value per Ton of Other Hard Coal Mined Outside of Pennsylvania, 1913-1928

Year	Production (Net Tons) Virginia	Arkansas, Colorado, and New Mexico	Total	Average Value per Ton Virginia	Arkansas, Colorado, and New Mexico	Total
1913	54,579	308,745	363,324	$1.54	$2.76	$2.58
1914	45,151	300,927	346,078	1.98	2.50	2.43
1915	51,141	325,255	376,396	2.16	2.95	2.84
1916	109,543	415,699	525,242	1.69	2.78	2.55
1917	127,836	446,337	574,173	2.71	3.73	3.50
1918	127,448	441,556	569,004	3.21	5.13	4.70
1919	105,753	372,258	478,011	3.11	5.42	4.91
1920	163,728	424,403	588,131	3.88	6.06	5.45
1921	85,161	*329,184	*414,345	4.08	5.75	5.40
1922	114,111	208,314	322,425	4.49	6.44	5.75
1923	213,659	412,021	625,680	4.82	5.61	5.34
1924	186,084	518,429	704,513	3.68	5.06	4.70
1925	266,657	519,937	786,594	3.75	4.75	4.41
1926	263,823	579,302	843,125	4.07	4.80	4.57
1927	158,828	493,041	651,869	2.83	4.99	4.46
1928	171,896	540,510	712,406	2.78	4.64	4.19

*Includes a small tonnage of bituminous coal from a different seam for one mine in Colorado.

separation has been made in Tables I and III.

Of the two regions, Virginia has shown the greater proportionate gain in production. The output of 171,896 net tons of "Great Valley anthracite" in 1928 was over three times that of 1913; and the maximum production in 1925 was almost five times the 1913 tonnage. The changes in both production and value from 1924 to 1928 serve to emphasize how sensitive the market for "Virginia anthracite" is to the status of competitive fuels. Under normal conditions, competition from Pennsylvania anthracite and West Virginia low-volatile coals is encountered wherever the Virginia operator seeks to find an outlet for his domestic grades. Moreover, in the urban communities of easiest access, which are in the Middle Atlantic States, the use of Pennsylvania anthracite by householders is virtually a custom. In the struggle to gain an entrée to consumers' bins, it has been necessary to offer the Virginia coal at prices considerably below those current for the Pennsylvania product, and the result of this constant pressure upon prices is reflected in the curve shown in Fig. 3. During the sixteen years under consideration, a ton of "Great Valley anthracite" has always brought less than a ton of hard coal produced in the western region, which is comparatively free from the competition of Pennsylvania and West Virginia.

Despite a sharply competitive environment, the increased production in recent years shows that "Virginia anthracite" has been growing in favor among householders who are interested in a high-grade domestic fuel which can be obtained at a price somewhat less than that obtaining for Pennsylvania anthracite; and at present it enjoys a fairly wide distribution. According to data furnished by an official of the Anthracite Coal Operators' Association of Virginia, the principal market is in the Eastern States, with some shipments to the South and occasional tonnage moving to Canada and the North-Central West. In addition, almost 7 per cent of the 1928 production of "Virginia anthracite" was used as a raw material by briquetting plants located in southern Virginia.

Although the Western hard-coal region has not shown the same proportion of increased tonnage since 1913 as Virginia, it is the larger producer, and output during the past three years has been more than twice the Eastern production. In general, the steady growth in the Western region from 1913 to 1928 without abnormally abrupt fluctuations in either output or values (excepting years of major labor difficulties) reflects certain responses to the larger considerations of supply and demand characterizing the market for high-grade household fuels in the Middle West. The fact that the level of production and prices has been so maintained is partly explained by the protection in marketing which distance from eastern competition gives the operators in the West.

In a large portion of the area west of the Mississippi, the long rail or water-and-rail haul requires a retail price for Pennsylvania anthracite which is practically prohibitive to most householders. It is in this territory that the relatively nearby Western hard coals can be sold at retail prices approximating, and even in some cases exceeding[6] the retail prices obtained for the Pennsylvania product on the Atlantic seaboard. In comparison with the average value of "Virginia anthracite," sold under intensively competitive conditions, the average value of the Western hard coal has been the higher during each of the sixteen years studied, and the differential has at times exceeded $2 per ton. Also, from 1913 through 1923, the average values for the Western region (on all hard coal produced, including steam grades as well as prepared sizes) exceeded those for Pennsylvania anthracite; for the period 1924-1928, the situation was reversed, partly due to the wage increases in Pennsylvania already referred to, and differentials prevailed in favor of Pennsylvania anthracite.

Of the three districts in the Western region, the one in Arkansas has the largest output and probably enjoys the widest market. In some years its production, coming from the coal beds near Spadra and Russellville, has been more than double the combined tonnage of Colorado and New Mexico. In 1928 "Arkansas anthracite" made its maximum output, though its production in the years 1923-1928 was but little less.

As shown in map, the Arkansas operators are prepared to, and do, serve consumers over an unusually broad area, covering fourteen states. The graph depicts distribution figures for the coal year ended March 31, 1929. Twenty-four per cent of the shipments during this period went to Kansas; Minnesota received 19 per cent; Missouri, 14; Oklahoma, 13; Nebraska, 12; Iowa, 6; Texas, 3; South Dakota, Illinois, and Louisiana,

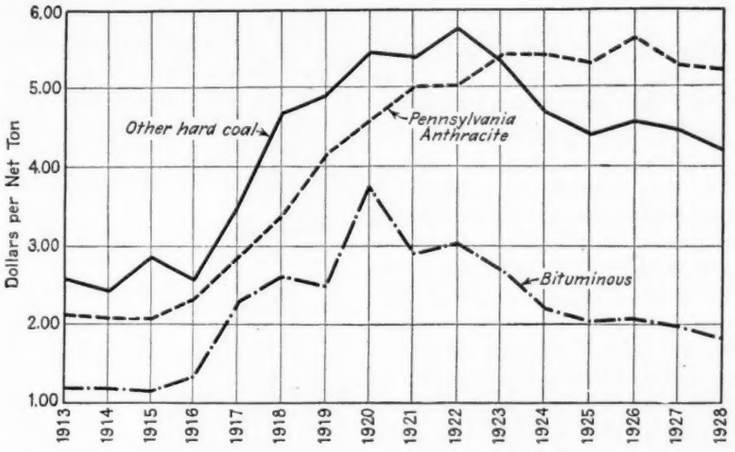


Fig. 2—Trends in the Average Value Per Net Ton of Bituminous Coal, Pennsylvania Anthracite, and Other Hard Coal Mined Outside of Pennsylvania

Table II—Relative Rates of Growth of Bituminous Coal, Pennsylvania Anthracite, and All Other Hard Coal in the United States, 1913-1928

(The figures for the year 1913 are represented by the number 100, and the figures for all other years are expressed as percentages of the 1913 rate.)

Year	Bituminous Coal	Pennsylvania Anthracite	All Other Anthracite and Semianthracite
1913	100.	100.	100.
1914	88.	99.	95.
1915	93.	97.	104.
1916	105.	96.	145.
1917	115.	109.	158.
1918	121.	108.	157.
1919	97.	96.	132.
1920	119.	98.	162.
1921	87.	99.	114.
1922	88.	60.	89.
1923	118.	102.	172.
1924	101.	96.	194.
1925	109.	68.	217.
1926	120.	92.	232.
1927	108.	88.	179.
1928	105.	82.	196.

[6]See prices quoted for December, 1927 and 1928, for "Colorado anthracite" in Denver and Salt Lake City; for "New Mexico anthracite" in San Francisco; and for "Arkansas anthracite" in Kansas City, Mo., Dallas, Texas, and Little Rock, Ark. *Monthly Labor Review*, Vol. 28, No. 2, February, 1929; pp. 163-164.

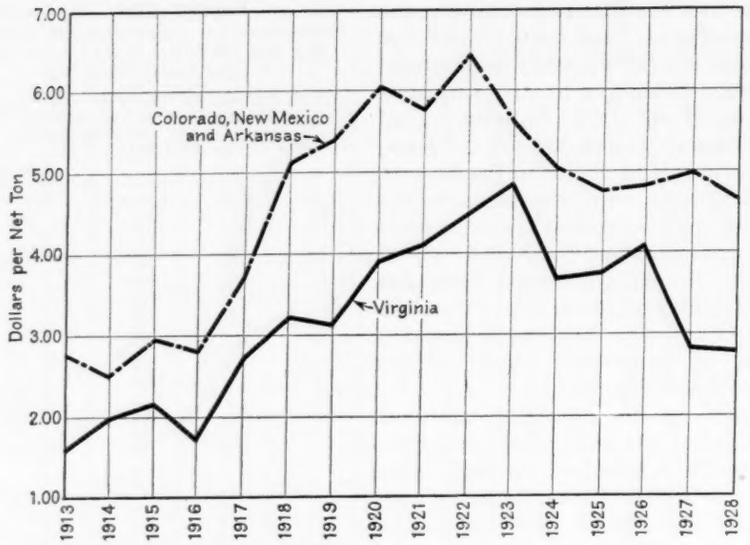


Fig. 3—Average Values of Hard Coal Mined in Districts Outside of Pennsylvania During the Period 1913 to 1928

1 per cent each; Mississippi, Wisconsin, and Tennessee less than 0.1 per cent each; and the remaining 6 per cent stayed in Arkansas.

Four main sizes are prepared for shipment in the Arkansas field. These are: grate, egg, No. 4 (closely approximating nut), and slack. Dry screening for sizes is the dominant method of preparation. A considerable quantity of "Arkansas anthracite" screenings is sold to zinc smelters located in the gas fields of Oklahoma and Kansas. In 1928 the quantity disposed of in this way constituted 16 per cent of the total shipments. Some of the slack also is delivered in the Kansas City (Mo.) district for briquetting. As in other branches of the coal industry, however, there is frequently a surplus of screenings over and above smelter and other requirements.

"Colorado anthracite," produced in the Crested Butte field of central Colorado, also is widely distributed. According to information available for 1922, Denver consumes more than any other city; San Francisco is next, and Kansas City third. At times shipments have penetrated into Mexico and British Columbia, and even into Alaska.[7]

Like the Colorado product, the "New Mexico anthracite" brings premium prices wherever it enters the coal trade. It is produced from a coal seam at Los Cerrillos, near Albuquerque, N. M., and it is marketed principally in the Southwestern States and in Mexico. According to the New Mexico State Mine Inspector's report, the 1927-28 production was sold in the States of California, New Mexico, Texas, Kansas, Nebraska, and in Old Mexico.

Various details of operation in the hard-coal industry outside of Pennsylvania are shown in Table III. In recent years more than two thousand men have been employed, and about one-fourth of these were in the eastern region. While Virginia had a smaller total output and employed less men during each of the three years, its average daily production per man was somewhat higher than that of the combined western districts.[8] For both eastern and western regions, the average daily output per man was 2.47, 2.41, and 2.26 net tons in 1926, 1927, and 1928, respectively—somewhat above the average daily production of 2.09, 2.15, and 2.17 net tons per man in the Pennsylvania anthracite industry in the same years.

Stimulated by the relatively strong coal market in 1926, all other hard coal operations worked an average of 170 days. With the reassertion of depressed conditions in 1927, average working time declined to 130 days. In 1928 it was 129 days compared with 203 days for the entire bituminous industry and with 217 days for Pennsylvania anthracite. A study of records not available for publication shows that in 1926 the hard coal districts in two states worked more steadily than the bituminous mines in the same states. In 1928, as in 1927, this was true of only one of the districts.

With an average working time of 129 days, the 1928 output of 712,406 tons represents a production of about 5,500 tons a day. It may therefore be stated that, assuming an average working time of 280 days, these mines have a demonstrated capacity, with existing labor force and working conditions, of at least 1,540,000 tons a year.

Approximately 2 per cent of the total output of all other hard coal is used for fuel at the mines. Another 2 per cent is sold locally, and the remaining 96 per cent is loaded for shipment to market.

[7]Schloss, Charles M., "Crested Butte Field Produces Four Kinds of Coal from a Territory Five Miles Wide," *Coal Age*, Vol. 22, pp. 667.

[8]The specific performance in terms of productivity per man per day in each of the western districts is obscured by the necessity of using an average for the group. In fairness, it should be said that one and often two of these districts exceed the average daily output per man of the eastern region.

Table III—Production, Value, Men Employed, Days Worked, and Output per Man per Day at the Principal Hard Coal Mines Outside of Pennsylvania in 1926, 1927 and 1928

State	Net Tons: Loaded at Mines for Shipment	Net Tons: Sold to Local Trade and Used by Employees	Net Tons: Used at Mines for Steam and Heat	Net Tons: Total Quantity	Value: Total	Value: Average per Ton	Number of Employees: Underground: Miners, Loaders, and Shot Firers	Number of Employees: Underground: Haulage and Track	Number of Employees: Underground: All Others	Number of Employees: Surface	Number of Employees: Total	Average Number of Days Worked	Average Tons per Man per Day
1926													
Virginia	244,507	13,822	5,494	263,823	$1,072,556	$4.07	198	30	55	121	404	256	2.55
Arkansas, Colorado and New Mexico	555,261	10,954	13,087	579,302	2,778,892	4.80	880	96	222	405	1,603	148	2.44
Total	799,768	24,776	18,581	843,125	$3,851,448	$4.57	1,078	126	277	526	2,007	170	2.47
1927													
Virginia	145,474	9,579	3,775	158,828	$449,059	$2.83	246	48	33	100	427	132	2.82
Arkansas, Colorado and New Mexico	479,912	4,665	8,464	493,041	2,459,616	4.99	916	136	275	328	1,655	129	2.31
Total	625,386	14,244	12,239	651,869	$2,908,675	$4.46	1,162	184	308	428	2,082	130	2.41
1928													
Virginia	160,558	7,724	3,614	171,896	$477,187	$2.78	356	49	33	112	550	128	2.45
Arkansas, Colorado and New Mexico	522,490	5,749	12,271	540,510	2,506,791	4.64	1,175	170	205	353	1,903	129	2.20
Total	683,048	13,473	15,885	712,406	$2,983,978	$4.19	1,531	219	238	465	2,453	129	2.26

ENGINEERING

+ Plays Leading Part in Battle for Anthracite Markets

By E. H. SUENDER

Vice-President and General Manager
Madeira, Hill & Co.
Frackville, Pa.

CONDITIONS imposed upon the anthracite industry during the World War coupled with the poor service to the consumer due to strikes of five or more years ago brought depression to the industry.

A satisfactory long-term wage agreement in 1926 plus a better understanding of the industry's problems on the part of employees and public groups in the anthracite field have given the operators of the region much encouragement. The improvement in these relations has sufficed to warrant large appropriations for advertising, new construction, remodeling and consolidation of plants, broadening of fuel service, research and improvements in general in the mining, preparing and marketing of the product. This work is going ahead on an extensive scale. Engineering progress is everywhere apparent.

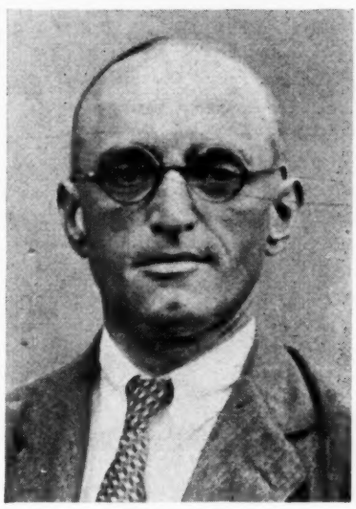
The thick-vein gangway of the past with its tremendous costs for the upkeep of timbering is being displaced by gangways driven in the rock under the coal beds. The coal is mined through rockholes driven off these rock gangways. This method of operation, though it has resulted in a much larger original outlay, has greatly reduced the ultimate cost per ton of coal produced.

Longwall methods of mining of various kinds, the nature of which depends in each case upon the mining conditions, the vein, the roof and bottom, and the pitch of vein, are making some headway in the anthracite field.

Blasting of coal electrically, rather than with squibs or with powder-fuse and caps, is gaining much ground. At the same time accidents from blasting show marked reductions.

Mining by stripping of overburden, despite its tremendous cash outlay in advance of the winning of coal, is more frequent today than ever, because this method of operation decreases production costs.

The old steam stripping shovels of



E. H. Suender

1½-cu.yd. capacity are being replaced with modern electrically operated shovels with a capacity of 2½ to 6 cu.yd., preceded by electric- or gasoline-driven well drills; the old 5- to 10-cu.yd. hand-dump stripping car is giving way to 20- to 30-cu.yd. all-steel air-dump cars, aided by standard locomotives and track equipment of standard railroad gage. As a result, the proportion of burden to coal which it is considered feasible to remove has increased from the ratio of three to one of earlier practice to 7 cu.yd. of burden, and even more in some instances, to 1 cu.yd. of coal.

NON-PERMISSIBLE blasting powders have been replaced by permissible powders approved by the U. S. Bureau of Mines, decreasing the risk of igniting the gases in our gassy mines and lessening accidents.

The use of liquid carbon dioxide in steel tubes inserted into large diameter drillholes in coal has made its appearance in the anthracite field and may make some progress. The general application of this device, if it can be economically used, will add much to the safety of miners and probably will increase the percentage of production of the larger sizes of coal. The miner's oil lamp and the carbide lamp are being rapidly superseded by the electric cap lamp.

Increasing quantities of anthracite are being undercut before shooting, particularly where the coal lies reasonably flat. In such flat measures the coal in larger tonnages every year is loaded, especially when the veins are thin, by mechanical scrapers and conveyors. When the vein thickness permits, coal is loaded mechanically from the face directly into the car.

In the driving of rock tunnels it was almost the universal custom a few years ago to hand-load the rock into mine cars, a laborious and costly job. Mechanical loaders operated by air or electricity are coming into general use.

The mechanization of mining makes for a concentration of work, a better opportunity to supervise it, the elimination of many men and consequently a lower cost.

Timbering is an expensive item in the anthracite fields. About 23 lb. of timber is used for every ton of coal produced. Decay, abrasion and destruction, the last being due to roof pressure, limit the life of the timber to approximately three years. Consequently, treated timber is in greater demand, as it lasts from two to ten times as long as untreated material. A more general use would be made of treated timber if it were not for the exorbitant cash outlay that must be expended during the first period of from three to five years before the savings are reflected in cost.

THERE is hardly any question that there are greater opportunities for ultimate reductions in timbering costs through the more general use of treated wood than can be found in any other single item on the cost sheets.

Nearby timber lands in the anthracite field are all but exhausted, and many companies are doing their share of reforestation. Forest protective associations, working in co-operation with the State Forest Department, have accomplished much in removing forest-fire hazards, and in quickly extinguishing fires as they start. Fire wardens and organizations with adequate fire-fighting equipment are on duty during the forest-fire season. Steel watch towers suitably provided with telephone facilities are erected on high ground overlooking the forested lands.

Our old friend, the mine mule has been largely displaced by electric-trolley and storage-battery locomotives. In the mine 25- to 30-lb. rail is being displaced by rail of 40, 60 and 80 lb. to the yard. The many miles of railroad with which a single mine is equipped are in some cases operated by dispatchers with block-signal systems. All-steel mine cars, with spring drawbar couplings and roller bearings are rapidly eliminating the wood car with its high maintenance cost.

THE old steam reciprocating pump is making way for the modern centrifugal electrically operated unit, and the pumpman of the past is being displaced by an automatic control that is almost human in its operation. Electric controls are so arranged that when one of these pumps stops, due to any trouble whatsoever, it makes three attempts to start, and failing to do so, it does not try again but flashes a signal in a distant office, calling for help. There are over two hundred of such automatic plants in the anthracite field. The effect of sulphuric acid on pumping machinery has resulted in the use of acid-resisting metals, the latter effecting a material reduction in maintenance costs.

The old steam hoist has seen its day, and though there are many still in existence, they are slowly being displaced by modern electrically-operated hoists having every known safety device to protect the lives of the men who travel on the cars or cages.

In the preparation of coal, maximum effort is being made to obtain a product of better and better quality, and, because the consumer desires it, a coal of a better and better appearance. To this end, according to estimates, the industry has spent $20,000,000 a year more during the past several years, than was previously spent for this purpose. The old method of jigging coal, while quite efficient, is from present indications likely to be superseded by the sand-flotation method, or by the system that separates the coal from the refuse in a flowing stream of water supplemented by an upward stream which flows through traps arranged for tapping refuse from the flow of material. The aggressiveness of those advocating the two new systems is unquestionably spurring the manufacturers of jigs to produce a machine that will materially improve the present practice, and which possibly will give a separation equal to that attained by the newer equipment. Unless this is done the jig method of separating coal from refuse will slowly pass into the discard.

THE old method of inspecting coal by hand, with its chance for error, is slowly giving way to a system in which a machine with a zinc-chloride solution of a predetermined gravity, makes the desired separation.

The old wood-constructed preparation plants, with their high maintenance costs and fire hazards, endangering investments in each instance of from two to ten million dollars, are being replaced by concrete-and-steel fireproof structures. Preparation plants which formerly handled the product of only one mine are now being replaced by large breakers preparing the product of two or more mines, thus effecting a material reduction in costs. Where mine water is used for washing coal, it is more generally neutralized than in former years.

Electricity is coming into general use. Many collieries are now operated 100-per cent electrically. Its application results in a more flexible and dependable power service and uniform predetermined speeds of all machinery and therefore in better preparation of the product. Marked economies are effected when a colliery is completely electrified.

In gaseous sections of the mines, permissible flameproof electric motors are replacing the motors of a few years ago. The U. S. Bureau of Mines subjects these to a rigid test before giving them its approval.

Application of magnetic clutches to the stopping and starting of machinery is making headway. Telephone intercommunication between various sections of the mine, breakers and offices, is practically complete.

Accident prevention is receiving more and more attention from management with records indicating a slow but constant improvement over past years. Management is accepting responsibility for accidents today which but a few years ago would have been classed as due to the carelessness of an employee.

NOT only is dangerous machinery of all kinds properly surrounded with safeguards but an educational safety campaign is actively in practice at nearly all mines. The use of special wearing apparel, such as hard-boiled hats and caps, goggles and asbestos hoods, when doing special work, is becoming increasingly prevalent.

Few are the mines that do not have their safety committees, and that do not hold safety meetings to discuss hazardous conditions and details of accidents, in order that their recurrence may be prevented.

A new anthracite spirit, a new community of interests, now prevails in the coal fields. Operators therefore have more confidence as to their ability to give better and continuous service in the future. Accordingly there is less hesitancy in authorizing expenditures that tend to lower costs, improve product or service.

Anthracite interests have just begun the battle for the domestic fuel business in the territory that normally consumes anthracite; they do not intend to permit the high first cost or high ultimate cost substitutes to displace its unique, unfailing, dependable, healthful and economical fuel.

WANTED:

+Mineral Industries Colleges

By EDWARD STEIDLE

Dean, School of Mineral Industries, Pennsylvania State College, State College, Pa.

TO THE WORK of pioneers in the mineral industries the United States owes its greatness. Even today the wealth of the nation rests basically on its mineral resources. The task of the pioneer was to locate and develop in a rude way the mineral fields of the nation. Today, mining men are still in great demand, but now usually for a different purpose: to utilize our limited and waning mineral resources to the best advantage. The mineral industry needs today the trained mineral technician rather than the adventurer type of the earlier days.

The colleges must supply to industry promising young men who have received a foundation of pure science on which applied science has been erected as a superstructure. To this the college adds also a cultural background, a studious and keen appreciation of human nature, including the problem of dealing with labor and of meeting consumer demands. The responsibility of laying for these young men their technical foundations rests with the college; that of training them in plant practices and operations devolves on industry.

The mineral industries are in a fluid condition. Invention, scientific discoveries, and research hurl new problems at them more rapidly than ever before. Until recently coal still went into railroad cars without any preparation other than screening. Due to recent developments in combustion engineering and processing practices, the consumer now carefully specifies the character as well as the size of the coal he will buy. Consequently, problems in coal cleaning and beneficiation have become of outstanding importance. Electrification and mechanization of mines is another development in the industry which is calling for the highest degree of technical skill. With these changes are linked problems in methods of mining and roof control.

There also is a trend toward re-

Dr. Edward Steidle

financing and consolidating or merging of mines, and the solution of many of the larger economic problems lies in this direction. Revolutionary changes of a similar character are taking place in all branches of the mineral industries such as metal mining, oil and gas production, fuel technology, metallurgy, and ceramics.

Education in the mineral industries is as much in a state of flux as industry, and colleges should take an inventory of their physical plant, organization, and work, in order that they may find out where improvements can be made. There are nearly sixty state and privately endowed colleges in the United States giving courses in one or more branches of the mineral industries. In some cases the schools are separate institutions, and several of these are now entering the field of engineering and chemistry. In other places, mineral industry courses are grouped under engineering. At other institutions the different courses, though separate divisions, are administered as part of the engineering department, while in others the mineral industry courses make up a distinct school of the college, similar to agriculture, engineering, liberal arts, etc. This lack of uniformity is regarded in many quarters as a serious weakness in mineral-industry education.

The first curriculum in this form of instruction was in mining engineering, hence the traditional name "school of mines." Later some colleges changed the designation to "school of mines and metallurgy." This name is even more misleading in this mineral age, because it singles out two departments and gives no identification to others in the school. These names are still used at a number of leading institutions, but no longer do the designations aptly fit mining schools which are located in states having a variety of mineral resources and industries. In such states schools of mineral industries are as much needed as schools of agriculture.

The ideal organization, from a pedagogical viewpoint, is to place

under one head all work pertaining to the mineral industries. Such work would embrace geology, mineralogy, and geography, as well as oil and gas production, mining, fuel technology, metallurgy, and ceramics. Independence makes for prestige, individuality, initiative, and efficiency. With such independence the usual "ifs" and "buts" and other alibis are eliminated.

Mineral-industry courses are as individual as courses given under agriculture and engineering. For example, mining and oil and gas production are the application of science and engineering to the exploitation of mineral deposits. Metallurgy is more largely the applied chemistry of metals; ceramics the applied chemistry of clays and synthetic silicates; fuel technology the applied chemistry of fuels; while geology, mineralogy and geography stand by themselves. There probably are more than 500 men engaged in mineral-industry education in the United States, but there is no society for the promotion of progress in that direction. Relatively few of these educators belong to any other society for the promotion of education, principally because none of them fits their needs. Mineral-industry education will never come completely into its own until the men engaged in the work are organized and have a progressive program.

As there should be more education in mineral industries, so must there be more business in mineral education, for, after all, education is a business and may well follow business principles. The high-school graduate is raw material which must be processed into a marketable product. In turn, the product may be sold to the consumer, the mineral industries, and then serviced until assimilated. In the last analysis, on the success of the product will depend the success of the school or the college.

Many schools lack close contact with the industries. The day is past when a school can hang out its shingle and take the business that happens to come its way. The school is really a part of industry and can best serve it by having organized contact with its leaders. This may be accomplished through advisory boards made up of leading operators, engineers and scientists. The members of the boards will have more than passing interest in the school and will give it their best counsel. The student, having been educated under suggestions and advice from the board, will be given after graduation preferential treatment by its members.

Another method of keeping in close contact with industry is through the establishment of mineral-industry experiment stations similar to those conducted for the benefit of agriculture. These will form powerful aids to graduate instruction, a training which is essential to qualify men for the highest type of research. The mineral world is beginning to realize that the present slow progress in its industries is due, in a large measure, to a lack of research and to a shortage of young men suitably trained to make investigations into the less understood problems which confront the mineral industries. It has seen the outstanding prosperity of those manufacturing industries that have taken advantage of research and is inquiring what it may be expected to do to improve its own conditions. It is asking for men trained in this direction and with particular reference to mining, beneficiating, processing, and utilizing mineral substances.

Contact with the research staff of the experiment station will be stimulating and helpful to the undergraduate students and the instructional staff. The plan should provide the faculty with facilities for part-time and summer-period research. The industrial contacts made through the experiment-station work should make the teaching facilities of a mineral-industries school better known to the people of the state.

In land-grant colleges and state universities the mineral-industries experiment station will be the logical agent for making such departmental state investigations as may require laboratory and research facilities.

IT HAS been said: "Though it may be impossible to bring the masses requiring education to the university, may not the university be brought to them?" Thus began the extension idea, which has become an important factor in American education. State institutions should make their services available to everybody. The character of the mineral industries prevents a wholesale exodus into classrooms, so all state schools should recognize the need for extension service. Some of this mining-extension work can be carried on under the federal Smith-Hughes plan in co-operation with the state department of public instruction.

Mining sometimes has been called a hazardous undertaking. For this reason the ever-watchful women of the country have voiced serious objection to participation of their husbands and sons in such industries. But modern mining education is laying great stress upon safety engineering, and the well-trained mining engineer of the future will not have to worry concerning his own hazard or that of his men. Safety or accident prevention will be more than a slogan; it will be an established fact.

IT IS well to dispel any popular belief that the mining engineer spends all his time in a quarry or in the interior of the earth. On the contrary, the successful man in this profession probably finds himself in the chair of an executive, as a skilled specialist directing big industries.

Mineral-industry educators must work in close co-operation with the public-school system of their respective states. While the initiative must be taken by the mineral-industry educator, the public-school official will be willing to co-operate, especially if his teaching duties are performed in schools located in mineral-industry centers where his job depends on the prosperity of the community.

Some elementary work could well be given as early as the third grade, covering suitable information about the mineral industries, especially those located near at hand. In this way the younger generation would not be educated away from the mineral industries by the electric train, steam engine, and other mechanical toys. In connection with the popular-science courses in the high schools, additional work in regard to the mineral industries might be given to offset the influence on youthful minds of the radio, automobile and airplane.

The public appears to have forgotten the vital relationship which exists between mineral industries and the history of civilization and the great economic importance of these basic industries to the life and prosperity of states and nations. What investment can a state make that will yield greater dividends than one which provides capable technicians to control its industries? Because of the tendency of the public to forget these simple facts the mineral-industry educators must not hesitate to advertise their wares. Only the combined efforts of industries, schools, mining societies, and trade and technical journals can make the world "mineral minded" and thus duly conscious of the one factor without which civilization cannot endure or progress.

OLD YEAR

+ Leaves Mark on Methods And Mechanisms

By R. DAWSON HALL
Engineering Editor, Coal Age

SO IMPORTANT has been mechanization and coal cleaning in the engineering progress of 1929 that movements less heralded are likely to be overlooked. Yet they may in time prove as revolutionary as either machine loading or beneficiation of coal. As these two subjects are to be treated elsewhere in this issue, neither will be noted here in this brief introduction to the articles from the field.

Of all the trends in the year 1929 none has been more marked than that toward stripping. In both anthracite and bituminous fields, strip mining is becoming quite general wherever conditions favor the practice. The percentage of stripped coal increases year by year. Three phenomenally big shovels have been installed. One, that of the United Electric Coal Companies at Duquoin, Ill., has a 15-cu. yd. bucket and a 120-ft. boom. It is a strong shovel for use in loading shattered rock. In actual weight and in ability to move a great depth of overburden and to shift it over a long radius, it is undoubtedly the biggest shovel to be found anywhere in the world.

Another big shovel is that operated by the Pittsburg & Midway Coal Mining Co. in Missouri. It has a 16-cu.yd. bucket, which is actually 1 cu.yd. bigger than that at Duquoin, but it is designed to work in soft overburden. Its weight and its reach also are less than that of the shovel installed at Duquoin.

However, the 12-cu.yd. unit is still the standard for large shovels; for how long remains to be seen. The Sherwood-Templeton Coal Co. has installed one at its mine near Linton, Ind.; the Patoka Coal Co. one at its Winslow mine, also in Indiana, and the United Electric Coal Companies, two at its Duquoin mine.

The third shovel in the group is by no means the world's largest by any manner of calculation; but none nearly so big is being used in the United States for the specific purpose to which it is being applied: namely, the loading of coal into cars. The size of the buckets used at the Sherwood-Templeton and Patoka Coal companies for this purpose is 3½ cu.yd. and that at Duquoin is 3 cu.yd. These are large pieces of equipment as compared with other shovels performing the same function, for the size of the loading shovel must depend in a degree on the size of the cars to be loaded and on the thickness of the seam being worked. At the first mine 35-ton cars are used and at Duquoin, cars of 44-cu.yd. capacity. At the latter mine the coal is lifted from a 6½-ft. bed and in Indiana the coal is about equally thick. The shovels can, therefore, be made big, though not as large as the shovel about to be described, which not only loads into railroad cars but takes its coal from a 28-ft. seam. This big shovel is operated at Colstrip, Mont., by the Foley Bros., Inc., of St. Paul, Minn., on behalf of the Northwestern Improvement Co., a subsidiary of the Northern Pacific R.R.

It is equipped with a dipper of 8-cu.yd. capacity, has a 68-ft. boom and a 48-ft. dipper stick. It will load 8 tons of coal with each swing of the shovel and the capacity of the unit in

Savings of time formerly wasted, adaptation of workings to loading machines, larger strip-pit units, construction of elaborate cleaning plants at strippings, steel posts and arches, multiple shifts, crushing of lump coal, reduction of waste in cleaning and improvement in explosives were among the methods by which the cost of coal was reduced in 1929 and the quality of product improved.

a 10-hr. shift exceeds 5,000 tons. Perhaps this is the largest shovel engaged in mining coal, but a few years back the Australians had one at Yallourn, in the province of Victoria, which was loading coal from a seam of an average thickness of 163 ft. and dumping it in a hopper. This shovel, which may still be in operation, has a 9-cu.yd. bucket. It was said to have a capacity of only 2,000 tons per shift. By this time it has probably been superseded by a German land dredge or *eimerbagger,* as was planned, but meantime it may have been shifted to the old pit. In that case it is the largest shovel in the world engaged in digging coal, and that at the Colstrip mine is the second largest.

IT is interesting to note that Foley Bros. are **opening a second pit.** The first is still, however, to continue in operation. It is 1½ miles long and about 900 ft. wide. The new pit will be 2 miles long and will contain upward of 11,000,000 tons of coal. It should meet the requirements of the railroad for eight years. Only about 1½ cu.yd. of earth will have to be removed per ton of coal recovered. The bucket that will handle this overburden will be of 10-cu.yd. capacity and the shovel will have a 100-ft. boom.

Digressing somewhat, it may be added that the coal mined at Colstrip is used by locomotives between Spokane, Wash., and Jamestown, N. D. It may be noted also that it is being used in the largest steam locomotive in the world, which runs between Glendive, Mont., and Mandan, N. D.; the fire box of the locomotive is 28 ft. 6 in. long by 9 ft. 6 in. wide; the grate is 19 ft. 2 in. long by 9 ft. 6 in. wide. The coal is crushed on the locomotive and distributed in the firebox by a mechanical stoker, which handles a maximum of 45,000 lb., or 22½ tons, hourly. The operating department of the railway company says that the open pit at Colstrip has been largely responsible for decreasing the Northern Pacific coal bill from $10,233,708 in 1923 to $6,113,721 in 1929. The Midland Electric Coal Co. has opened a stripping at Atkinson, Ill., and built a 5-track tipple on the Rock Island R.R. for the cleaning and loading of the coal.

It will be noted that the coal from the strip pit is crushed on the locomotive prior to use on the stokers. It is done there and not at the mine, because lignite slacks and burns if broken fine and placed in storage. More coal than ever before is being broken by crushers either at the industrial plant or at the mines. In fact this is one of the leading trends of the times. Reports show this practice is now growing rapidly at the mines, especially where stoker and locomotive fuel are being prepared.

However much the domestic consumer may like coal resembling Mycenaean building blocks, the industrial consumer in general dislikes them except for building a wall in a coal yard or for increasing the capacity of a locomotive tank by a similar trick. And really is it not questionable whether the domestic consumer's artistic taste cannot be and should not be trained to be better pleased with coal of smaller size, well-screened, than with a promiscuous lot of ungainly blocks of coal of divers dimensions that must be sized with the dull edge of a single bitted axe?

IN some sections of the country the consumer makes no demand for lumpy coal, having satisfied himself that egg or nut well-screened is not only more comely but more easily handled, less smoky and more economical in use. So crushers are appearing at the mines in larger and larger numbers.

With reasons not greatly dissimilar from those which animated the European mine owners, the American operator is beginning to favor the multiple shift. He has sorely regretted the need to buy more machinery and has tried to lower that investment by working the machinery he buys as many hours as possible.

In Europe it is the high constructional cost and the low productive result of deep shafts that brought the change. In America, strangely, it is a smaller investment and one, moreover, that is wasted rapidly by continuous use that has brought the double and triple shift. Apparently we blink little at the first cost of a plant but regard later improvements as a financial adventure all out of proportion to their cost, and consequently when we make them we have to limit their size by every conceivable device; this because the second financing is so much more difficult than the first. At least, this seems to explain in part the trend toward multiple shifting.

A DEVELOPMENT still immature, but probably of importance, is the introduction of steel props and arches in Maryland and the extension of the use of the Schaefer lining in the mines of the Hudson Coal Co. in Pennsylvania. In the future such supports will become more common, because of the readiness with which they adapt their length to the movement of the strata and also because of their long life. One must expect them to make their first appearance in places where that movement is greatest and the need to provide for it is most imperative, but in time they will be more generally favored, especially the steel supports.

They probably will find use in crushed and later in swelling ground and still later under sagging roof; that is under roof that sags solely because of lack of immediate support. How much the collapsible prop will be used under other conditions than these remains to be seen, but crushed ground will become increasingly common as the practice of mining superincumbent beds becomes more prevalent. Already in the anthracite region that practice is general. In Maryland for the most part there are but two beds, but the lower bed, the Pittsburgh or Big Vein, has made operation in the upper bed, the Sewickley or Tyson, a most difficult problem which only contractible props or flexible arches can solve. In reopening the Pittsburgh bed in Georges Creek the same dictum applies.

THE roof of the Pittsburgh measure in the No. 8 district of Ohio is an example of swelling ground that needs such devices. So also is the roof in the Gallup region in New Mexico and perhaps in the Dawson region also. Nova Scotia has areas troubled with such swelling ground.

It may be, however, that having established collapsible props under abnormal working conditions, their durability, compactness, easy adjustment, ready removal and insensibility to fungus may make them standard equipment, especially as the price of timber grows. Who knows? The steel tie, invented to economize height in low places, has invaded high coal. It has found an increasing opportunity for service. Perhaps the steel prop, edging its way in where the roof is crushed, may eventually find itself in places where conditions are less difficult and where, though the qualities that brought it before the public will no longer be of service, other qualities less obvious will render it attractive.

In the explosives field the tendency has been toward bulkier powders which break the coal with less shatter-

ing effect and toward pellet powder for which a new electric cap has been devised with two holes in the metal shell near the base that direct the flame from the burning powder sidewise toward the walls of the perforation in the pellet.

Tetryl, an organic explosive, said to be stronger than fulminate of mercury, is being used instead of the latter in some instances. The Cardox explosive has been redesigned. As a result the diameter of the cartridge has been reduced from 4 to 3 in. and its weight has been decreased proportionately.

In the articles that follow are presented the views of the several authors as to what were the important developments of 1929.

ILLINOIS Leans on Machines

By DAVID W. JONES
Superintendent
Valier Coal Co.
Christopher, Ill.

DURING the year 1929 definite progress has been made in Illinois in the mechanical production of coal. Nevertheless, there is not as yet any unanimity as to the best means for loading coal into the mine car, except that equipment designed to fit in with room-and-pillar methods of working always has received the preference of the Illinois operator.

Despite the differences of opinion, substantial progress has been made during the year in loading, cutting and drilling equipment. The trend has been to use track-mounted machines for cutting, shearing and drilling. This equipment has to be made extraordinarily rugged to stand the service expected of it, and this for the reason about to be described. Loading machines with caterpillar mountings still hold the favor of the field, and to operate these efficiently an even floor is needed, consequently the bottom-cutting machine cannot be permitted to make its cuts above the hard impurities that are found in the cutting stratum but must cut in them or the floor will be irregular. The machine must therefore be constructed so strong that it will cut its way through any material that presents itself.

The caterpillar loader has earned its popularity by its flexibility and adaptability for working in narrow as well as in wide places, but the advent of the track-mounted loading machine is inevitable, though it has not as yet come into general use. In the future steady progress may be expected from that type of loading machine.

The pit-car loader has made rapid strides during the past year. Many mines have been completely mechanized with this type of loader. Even the mines specializing in the larger types of mechanical loaders have found that where the roof is bad, the small pit-car loader is an indispensable aid for recovering coal, for often no timbering can be devised that will make the place safe for the larger machine.

The advent of mechanical coal loaders has brought the development of the electric coal drill to a high state of perfection. Today, coal can be drilled in several different ways: (1) By a mounted drill on a track-mounted cutting machine; (2) by a mounted drill on either a shortwall undercutter or breast machine; (3) by drills mounted on a self-propelled truck, and (4) by post-mounted drills. Operating conditions readily determine which is the most efficient method.

With the introduction of mechanical coal loaders in Illinois has come a change in development methods. Concentration of work is essential for efficient operation of these machines. The old method resulted in having working places scattered widely all over a large mine. A mechanical loader is of no avail in such working places.

The restrictions imposed by the mining law of Illinois on the time at which coal can be blasted with permissible powder does not permit mechanical loaders to be used with economy in entries, but these difficulties have been overcome to some extent by the development of the system of blasting coal with cartridges of liquefied gas. In this way it is now possible to advance an entry several cuts a day using a loading machine. However, entry drivers have long existed which permitted the extension of entries without blasting, and these machines are still being used.

Tipples built when the miner was paid for loading coal on a tonnage basis and was penalized for loading impurities have become inadequate for handling machine-loaded coal. The present trend is to provide tipple facilities for removing the impurities that the machine has loaded instead of curtailing production by attempting to clean coal underground. The modern tipple provides facilities for cleaning mechanically loaded mine-run coal as efficiently as different sizes of coal were cleaned in the past. Mine-run is today separated, hand-picked and then recombined and mixed as desired.

During the past year strip mining of coal has assumed great proportions. Illinois has taken leadership in this respect by putting into service the world's largest and most modern type of stripping machine.

Cleaning Off the Top of the Coal Before Loading—Truax-Traer Coal Co. Mine, De Soto, Ill.

MODERNIZATION in Western Pennsylvania

By W. A. WELDIN
Consulting Engineer
Pittsburgh, Pa.

DURING the past year the coal industry in western Pennsylvania has progressed in two directions: (1) Toward economy in production through concentration of operation, mechanization, etc., and (2) toward improvement in the product by the installation of cleaning plants, tipple reconstruction, and better underground practice.

In the coke region many individual steam plants have been displaced by central-station current. Some of these plants are at mines now idle, and the substitution has been made primarily to cut the standby costs. If these costs had not been reduced in this manner, much of the economy obtained by concentrating the activity in a few mines instead of several would have been greatly curtailed.

To the same desire to economize may be ascribed the extension of double and triple shifts underground in the coke region as also the further development of the so-called "concentrated" system of room-and-pillar operation. Though the area under development in the mines has been materially reduced, the output per day has been increased. Concentration has been the order of the day in the Pittsburgh district also.

Mechanization has shown a healthy rather than a sensational development. Though all the principal loading machines have been used in increasing numbers, it is my impression that the main movement in thick seams has been toward pit-car loaders and in thin seams toward hand-loaded conveyors. Longwall, long-face and V systems seem in general to have made little or no advance during the year.

Following the success of some of the coal companies in central Pennsylvania in the use of conveyors, either throughout or in parts of the workings, installations of one or of a few units at a time have been made in the thin coal of the Allegheny and Kiskiminetas valleys and indeed, elsewhere. The great economies thus effected augur a more general movement in this direction.

The movement toward an improved product has resulted in closer inspection at the face, in the introduction of better methods of handling drawslate (at least in the coke regions), in the cutting of the coal on the top or in center of the seam where impurities can thus be removed, and in a few instances in the vertical shearing of the face. So much for cleaner coal in the mine car.

On the surface, tipples have been changed to produce coal of a quality to suit a particular market. Crushers have been installed to break down the large lumps. High-speed screens, often of $\frac{3}{8}$-in. mesh or smaller have been introduced to remove dust from coal intended for stoker use, and also, as in earlier years, picking tables and loading booms have been provided to clean the coal and prevent degradation.

Several large washers were started or completed in 1929. Warden and Banning of the Pittsburgh Coal Co. have been adequately described in *Coal Age*, but not only should the washers themselves receive comment but also the large capacity aerial trams by which the output of other mines is conveyed to the washers. At Nemacolin the Youngstown Sheet & Tube Co. is building a Rhéolaveur plant to produce 650 tons per hour of metallurgical coal. Another 1929 washer worthy of mention is the Arms-type plant of the Clinton Block Coal Co. Still a newer one with Peale-Davis tables is being installed at the new mine of the Butler Consolidated Coal Co.

This latter mine has Oldroyd cutters making two center cuts in bone coal and one vertical shear cut; Oldroyd and Joy mechanical loaders, 6-ton steel cars, portable underground electric substations, a one-man bottom operated by push-buttons, underground bins for coal and bone, and a belt conveyor loaded at will with either coal or bone, which delivers to the tipple through a 600-ft. slope.

ALABAMA Clings to Brawn

By HENRY S. GEISMER
Consulting Engineer
Birmingham, Ala.

ALL of the larger operators in Alabama are still experimenting with mechanical loading of some description, but no noteworthy results were accomplished during the year 1929. Two of the larger operators are trying out light portable pit-car machines for loading coal into mine cars, the coal being shoveled by hand onto the loader. One of these operations is in the Pratt seam, having coal about 4 ft. thick, and the other is in the Big seam.

In the October, 1928, issue of *Coal Age* mention was made of scraper conveyors being tried out in the Barney and Ruby mines of the Alabama By-Products Corporation. During the past year the scraper conveyors which were originally purchased for room work have been transferred to development work, and for the principal loading the company is now experimenting with scraper conveyors using two drum hoists of local manufacture. At the present time about 60 per cent of the entire output of the mine is being loaded with scraper conveyors. This is the only operation in the state now using this form of loader.

The first pneumatic coal-cleaning plant to be installed in Alabama is nearing completion and will be in operation during the next few months. Two new washing plants were installed and put into operation during the year, and this state still continues to lead in the percentage of total output mechanically cleaned.

Little change was noted during the year in the number of mining machines and electric locomotives in use. Most of the small mines which depended entirely on hand mining and mule haulage have been closed down, and the larger mines have all been electrified. Several large mine fans driven by electric motors were installed during the year, but in each instance they replaced smaller fans also electrically driven.

Fewer mines were operated in Alabama during 1929 than in 1928, but increased tonnages at the mines in operation just about offset the loss of output from the mines which were closed down. A much larger tonnage of coal could be produced from the plants now working if the market would justify the increase.

Nearly all mines in the state de-

pending on purchased electric current have provided enough standby power to take care of their mine fans during interruptions of service. In most cases gasoline-engine driven generators or gasoline engines arranged for direct connection to the fans furnish power for emergencies. Three installations of this kind were made during 1929, the largest one consisting of a 565-hp. gasoline engine direct-connected to a 400-kw. generator. The use of electric lamps in coal mines was also extended during the year, 45 mines now being provided with such lamps.

STEEL PROPS and Arches in Maryland

By J. J. RUTLEDGE
Chief Mine Engineer
State of Maryland
Baltimore, Md.

DURING the year 1929 the State of Maryland made continued progress in its methods of working as well as an advance in the use of equipment, especially in the Big Vein mines. Some thirty or forty years ago the greater part of the market for the Big Vein coal of Georges Creek was in the New England states, and the consumers in that region were exacting in their requirements, stipulating that they be shipped nothing but "breast" coal, which was the middle part of the Big Vein and averaged in thickness 6 to 7 ft. It was the choicest portion of the seam. Because of this demand, from 2 to 3 ft. of roof coal was left in place unmined and an average thickness of 3 ft. of bottom coal also was left in place for the same reason.

In the last twenty years it has become the practice to rework these old mines where the breast coal had been mined exclusively heretofore, recovering the roof and bottom coal and what pillars had been left in previous operations.

Meantime, in some of the Freeport and Kittanning seams in Garrett County, of this state, it has become the practice to do as was customary in the Big Vein in earlier years; namely, to mine the breast coal and to leave the bottom and top portions of the seam unmined. This bottom portion is high in ash and adds greatly to the total ash when included in the coal loaded. Gratifying results have been obtained by adopting this plan in some of the mines near Oakland, Garrett County, and it is expected that it will be introduced in the operation of the thin seams of the Georges Creek district.

A mechanical loader has been working for a year in a Big Vein mine, principally for handling the waste material removed in forepoling through caved Big Vein workings. This machine seems to be giving good results. A few underground conveyors are in use in the Tyson seam, and recently some of the so-called "mat" type, with chain operation, have been installed. Because of their lightness and flexibility they have given excellent service. Several pan-type conveyors also have been in use, but because of the thinness of the seam in which they have been introduced—2 to 2½ ft.—the poor roof and the adverse grades, their successful operation has been hindered. As the Tyson coal is being mined in an area from which the Big Vein coal, about 100 ft. below, has been pillared, conveyors of this type work under great difficulty. For this reason a change probably will have to be made if this type of conveyor is to be used successfully in this seam.

One company has made experiments in a Big Vein mine with a steel prop and the results have been promising. Another company, also operating in the Big Vein, recovering abandoned pillars, has been using angle-iron arched timbers lagged with 1½-in. treated wood lagging, the ends of the arch resting on mud sills on the floor of the heading. These steel arches seem to withstand the side and roof pressures well, and apparently their use reduces the quantity of material to be removed about 30 per cent when forepoling through caved ground. Though difficulties have arisen, especially where two such timbered roadways cross at right angles, progress in that direction is being achieved. If the clearance can be made adequate it is believed that the new method will be workable.

More and more attention is being paid to the cleaning of coal, and though no coal washers are in use except a small one of Montgomery type, several dry- or wet-cleaning plants probably will be installed within the next year or two.

CUT COSTS and Increase Safety

By R. H. MORRIS
General Manager
Gauley Mountain Coal Co.
Ansted, W. Va.

DURING the year many machines have been installed for loading coal at the face in the medium- and high-volatile regions of southern West Virginia. This has facilitated the work of the miner and made it possible to clean the coal in the working place. The so-called mechanization of mining has provided means of concentrating the workings, thereby increasing supervision which tends toward safety, cleaner coal and lower costs.

Study and attention has been bestowed in the breaking down of the coal at the face, which has an important bearing on the production of clean coal, for there are but few seams that do not have impurities or a tender roof, the fragments of which must be handled at the face to insure a clean product.

Improvement has been made in the preparation of the coal after it reaches the tipple by the installation of picking tables for the larger sizes and loading booms for the careful loading of the coal in cars. For the smaller sizes in many plants either wet- or dry-cleaning equipment is being installed and in some instances a combination of both. Operators are making constant effort to put their coal on the cars in the best possible condition for successful disposal in the market.

The mining industry of southern West Virginia has taken, during the year, an active part in the state-wide safety movement. Sectional safety-day meets have been held, and in September the mining communities of the whole state participated in the State Safety Day.

SOUTHERN Wyoming Hits 50 Per Cent

By A. W. DICKINSON
General Superintendent
Union Pacific Coal Co.
Rock Springs, Wyo.

SOUTHERN WYOMING coal fields, comprising the operations in Carbon, Sweetwater and Lincoln counties, have continued in 1929 to center attention on the mechanization of underground coal-loading processes. As all the coal beds mined lie in pitches varying from 4 to 22 deg., the selection of devices has necessarily been a matter to be approached only after careful and exhaustive investigation and study. It is not surprising, therefore, that some of the operations have not as yet purchased equipment although interest is active and much thought is being given to the subject.

The accompanying table sets forth a close estimate of the quantity of coal mechanically loaded in the year of 1929, in tons of 2,000 lb.

Both commercial and railroad coal-mining operations have increased their mechanical loading equipment during the past year; much of the work, however, being considered as in the trial stage. Various methods of application of the loading devices are under way, but the general trend is to take the mining plan of the property as it exists and make the machine adapt itself to the work to be done. It is felt that the first consideration must be the training of personnel, from the staff men to the face. Any changes of the mining plan complicate this most important stage of the work and may, in the end, result in disappointment.

Experience of the past year still further confirms the belief in the safety and economy of distributing electrical power underground at 2,300 volts through the agency of armored cable suspended from messenger wire. Close inspection and liberal use of proper grounding are essential to the safe and successful prosecution of this practice, and the rewards are attractive.

In breaking down coal, power-driven drills, smaller diameter shot holes and smaller diameter permissible explosives marked the past year.

Southern Wyoming's Contribution to Mechanization

Operation	Tons Loaded Mechanically	Type of Machine
Colony Coal Co.	86,000	Shakers with duckbills.
Megeath Coal Co.	18,000	Shakers and pit-car loaders.
Ideal Coal Co.	68,000	Shakers with duckbills.
Kemmerer Coal Co.	167,000	Shakers.
Diamondville Coal Co.	9,000	Shakers.
Blazon Coal Co.	44,000	Shakers.
Union Pacific Coal Co.	1,774,000	Joys, shakers with duckbills, scrapers, Thews and pit-car loaders.
	2,166,000	

Carbon, Sweetwater and Lincoln Counties mechanically and hand loaded coal may be estimated at 4,800,000 tons, so 45.1 per cent was loaded mechanically.

Southern Wyoming Brings 45 per Cent of its Coal Out by Machinery, Mostly by Shakers Like That Shown

MULTIPLE SHIFTS Win Favor

By H. H. HASLER
Chief Engineer
Pennsylvania Coal & Coke Corporation
Cresson, Pa.

NO MARKED developments characterize the coal industry in central Pennsylvania during the year 1929, though progress has been made in the use of conveyors as a means of transporting coal from the working face to trips of cars in the entry. Some operators continue to use scraper loaders, but the number in use has not been materially changed during the past year. Mechanical coal loaders do not appear to have met with much favor in the district.

In general, where conveyors have been installed, the general development plan of the mine has not been greatly altered. The room-and-pillar system is still maintained. The principal change has been in the width of the rooms. Some operators have found it to be advantageous to advance one wide room at a time; others have adopted the two-room system, in which the coal is loaded by the miners on portable face conveyors, which in turn deliver the coal from two working faces to a main-line conveyor. Each of the two systems is claimed by its sponsors to have advantages which seem to be well founded in view of the existing local conditions. In advancing entries, conveyors have been used to great advantage, and the extension of their use for that purpose appears to be assured.

Having come to a fuller realization than before of the enormous investment in plant and equipment and having arrived at a conviction that these must be kept working if the lowest possible production costs are to be realized, many of the operators of mechanized mines have abandoned the single-shift system in favor of the double- and in some cases of the triple-shift system. What advantages are to be gained by multiple shifting can be best determined by a study of individual plant conditions.

Quite apart from problems incident to the mechanization of coal mines—although the demand is frequently more urgent where mines

have been mechanized—is the growing interest in mechanical preparation of coal. During the past year several such plants have been installed, and it is likely that the number will steadily increase.

For the cleaning of the larger sizes of coal, the wet method appears to be well adapted, while for the smaller sizes—that is, ¾ to ½ in. and finer—the air method of cleaning is generally favored, mainly because after treatment the coal is dry.

A marked reduction is noted during the past several years in the number of operating mines. Many of the mines which have been shut down have been allowed to fill with water and in most instances equipment has been transferred to other properties. On the other hand, in the mines that are operating, the work has been concentrated, thus so greatly increasing capacity that the potential capacity of the district has not been reduced.

MORE Tonnage, Smokeless Slogan

By BEN LAZEAR
Mining Engineer
Pocahontas Coal & Coke Co.
Bluefield, W. Va.

IN REVIEWING the engineering progress and trend of the low-volatile regions of West Virginia during 1929, the large increase of production over that of 1928 should be noted. Although complete statistics are not yet available, records of coal shipments to date from the Pocahontas, Tug River, Winding Gulf, and New River fields, comprising the low-volatile region of this state, indicate that loadings for the year 1929 will be well over 57,000,000 tons, a figure which surpasses the record established in 1926.

And yet no radical changes in mining methods and plans have been introduced. The general trend in mining is toward the concentration of workings and this has been accomplished by careful planning toward this end and closer supervision inside the mine. Hand loading predominates, although one large operating company has produced and is continuing to produce with uniform success a large quantity of machine-loaded coal. Some experiments are being made at present with late types of coal-loading and rock-handling machinery but, in general, operators are inclined to conservative methods, in view of the satisfactory results obtained.

A definite tendency may be noted toward greater refinements in methods of coal preparation, occasioned by the increased demand for prepared sizes. On May 11 of this year, the Smokeless Operators' Association adopted seven standard screen sizes ranging from 7½-in. lump to ¼-in. slack. As a result market demands are more intelligently met. Moreover, the individual operator is now making every effort to improve and insure the quality of his product.

In the mines, face methods that will eliminate all extraneous impurities and produce a maximum percentage of lump size are being sought and studied. To this end experiments have been made into cutting and shearing with gratifying results. Changes in the methods of cutting have resulted in many instances in increasing the percentage of lump coal produced and in decreasing the ash content. New methods of shooting also are being studied and tried and, where successful, are being adopted. Liquid carbon dioxide has been tested as an explosive in several mines with excellent results and is receiving serious consideration.

A well-defined trend is manifest toward the replacement of obsolete tipples and tipple equipment by structures and machinery of the latest type. No one form of cleaning device can be said to have received preference over the others in the field. The recently installed coal-cleaning installations vary in accord with individual preference and local conditions. They range from wet washers through air cleaners of various designs to combinations of air cleaners and wet washers. Screening plants of the latest type have been built, and they are designed to conform to the standards adopted for the sizing of coal for the market.

Another development in the treatment of coal is the so-called "dustless" process, which consists of spraying the prepared coal with a preparation. Coal so treated commands a substantial price differential on the market.

CRUSHING Coal to Requirements

By FRED B. McCLURE
Chief Engineer
Continental Coal Co.
Fairmont, W. Va.

BECAUSE of the depression in the coal markets of northern West Virginia which has persisted for several years the operator has come to realize the importance of making a careful analysis of his production costs so as to correct any items that may be out of line.

Most of the operators, particularly those having many or large mines, have given careful consideration to the possibility of mechanizing all the various details of operation and, indeed, some progress has been made in this direction during the past year. Mechanical loading has received the closest attention of any, and many companies have made experiments as to its applicability to their mines. As loading machines are installed in many cases in mines planned and developed for manual loading, the outcome usually is disappointing. The best results from any mechanical loading device can be obtained only by planning the method of development with that piece of equipment in mind. Machinery, especially that which is more or less in the experimental stage, cannot be expected to work perfectly in a mine not prepared for it. Even then, to get the maximum results takes time and continued effort.

To reduce the percentage of slack, where the coal is still being shot down by the miners, experienced shooters are being employed to act as instructors. Most of the companies, however, employ special men trained in that particular line to shoot down the coal. The foremen and superintendents can supervise and instruct such men more satisfactorily than they could the whole body of miners with whom shooting is not a vocation but merely a relatively unimportant adjunct to loading.

In many of the mines loss of time in underground transportation has been reduced to a minimum by the installation of signal systems and by dispatchers who control the movements of all main-haulage units. This provision tends not only to speed transportation but to reduce peak loads and to effect a material saving in power costs. As a result of the system, also, coal is transported more uniformly to the tipple, assuring a steadier operation of the outside equipment.

MECHANIZATION No Mere Word

CHARLES M. SCHLOSS
Consulting Engineer,
Lindrooth, Shubart & Co.
Denver, Colo.

AN ACCELERATED transformation almost magical in extent marked the year 1929 in Colorado's coal mines. Keen competition from without and within caused radical changes in both methods and equipment.

This combination of circumstances led several companies to introduce methods and equipment that were new to the state. Three companies, the Temple Fuel Co., Broadhead (Trinidad district); Alamo Coal Co., Alamo (Walsenburg district), and Fraker Coal Co., Bear River (Routt County), are using Cardox for blasting to a greater or lesser extent. Temple has installed shaker conveyor units and longwall faces. Alamo is using eighteen loading units, modified shakers, the invention of Charles Young, mechanical superitendent for the Alamo and Oakdale properties.

Jones shaking conveyors, perfected by G. D. Jones, of the Victor American Fuel Co., are producing 25 per cent of the output of Pinnacle and 100 per cent of the output of Wadge, both Routt County mines belonging to the Victor American company. Delagua, a Trinidad district mine of the same firm, is using one unit which has, incidentally, 2,600 ft. of trough operated by a single drive.

A Goodman power shovel is working successfully in the mine of the Colorado & Utah Coal Co. Pit-car loaders are operating at the mines of the Pinnacle-Kemmerer Fuel Co. and Hayden Brothers Coal Corporation, all in Routt County. Shearing machines were introduced into new places, notably in the new and old mines of the Moffat Coal Co., in Routt County, and in the mines of the Rocky Mountain Fuel Co., in northern and western Colorado.

Of major interest is the development and construction program incident to the enlargement of the Crested Butte operations of the Colorado Fuel & Iron Co. The Crested Butte mine, in western Colorado on the Denver & Rio Grande Western R.R.'s narrow-gage line, has not heretofore produced a large tonnage. It was necessary to screen and load the coal at the mine into narrow-gage cars, ship it to Salida, on the broad-gage lines, transfer the coal from narrow-gage cars to standard-gage by means of a "barrel-type" gondola car dumper which poured the contents of the narrow-gage cars into the large cars with much degradation of valuable lump coal, or do the work more carefully, yet much more expensively, by hand labor. But here again is transformation; henceforth run-of-mine will be shipped to Salida, will be transferred by the gondola car dumper onto an apron conveyor-belt system, then transported to a new screening plant now being built, where it will be carefully screened and loaded into equipment of standard gage.

The production of the mine will be doubled, necessitating the construction of an electric generating station, the installation of electric mining machinery and a general rehabilitation of the mine, this being necessary to afford the 200,000 tons additional output which the company's program demands.

Colorado's mines, one and all, are planning great progress in 1930. The outline above is but the beginning. Mechanization, modernization, are more than mere words—to the progressive operators of Colorado!

WASHINGTON Solves Oil Competition

By GEORGE WATKIN EVANS
Consulting Coal Mining Engineer
Seattle, Wash.

GIVEN a flood of oil, what can the mining industry do? Washington State in recent years, and not least in 1929, has been answering that question by practical demonstration. Some of the coal companies in the state are owned by railroads, but as their mine managers have to meet the competition of oil by prices for coal that justify operation with that fuel rather than with oil, they illustrate quite fairly how the contest may be expected to end.

Quite recently the Northwestern Improvement Co., which is affiliated with the Northern Pacific R.R., has made a number of improvements in the Roslyn field, including the installation of shaking conveyors, which are reported to be doing good work. The Bellingham Coal Mines at Bellingham, in Whatcom County, have had the courage to make improvements that will aid in meeting competition. In Thurston County the Washington-Union Coal Co., a subsidiary of the Union Pacific R.R., is still operating the Tono mine, producing a sub-bituminous coal that is used for domestic and railroad purposes. This mine is the dominating coal operation of the sub-bituminous field.

It was before 1929 that the Pacific Coal Co. decided that competition should be met by the construction of a modern mine at New Black Diamond and by the installation of a Rhéolaveur coal-cleaning plant at the same operation. No expense was spared in the development of this mine or in the erection of the cleaning plant, and it is noteworthy that in 1929 the company has been realizing the benefit of this bold step in modernization.

Washington State must compete also with coal shipped from Vancouver Island, and Utah and Wyoming both ship into eastern Washington and into the Sound country. Much coal comes into eastern Washington from the Crowsnest Pass district of British Columbia, this being, as a rule, special lump or coking furnace coal.

It is only fair to state that if fuel oil were not so cheap the production of coal in the Northwest would be several times what it is at present.

IOWA Mechanization Waits on Wages

By GEORGE HEAPS, JR.
President
Iowa Coal Operators' Association
Des Moines, Iowa

THE YEAR just closed has seen no advance whatever in mechanization in Iowa. This is partly due to the fact that mining conditions in Iowa are not conducive to the use of either mechanical or conveyor loading on any large scale and partly due to the absence of any wage arrangement that will permit of the use of either type of loader with any assurance of success. The underground conditions are such that except in very few cases it would be practically impossible to mechanize completely an Iowa coal mine. The wage scale for machine mining is so unfavorable that it is not economical even to use cutting machines except where some natural condition makes their use almost necessary.

Taking the state as a whole, it may be safely said that the Iowa mining industry has made progress in the last two or three years. The reduction in the wage scale that was secured in the union mines of the state has made it possible to increase production to a certain extent, at least in those mines having a wage contract with the United Mine Workers. It is hoped that when a new wage scale is made next spring an agreement on the use of some types of mechanical or conveyor loaders will be obtained that will permit a real attempt to be made to ascertain if they can be used economically in Iowa.

Aside from improvement in running time and some increase in daily production from those mines now operating, there has been little or no expansion in the industry, only one new mine of any size having been opened this last year, this being an operation of the Consolidated Indiana Coal Co., with a production of 1,500 to 1,800 tons daily.

LIGNITE Output Concentrated

By R. L. SUTHERLAND
Fellow in Lignite Research
University of North Dakota
Grand Forks, N. D.

IN NORTH DAKOTA the present trend in the lignite industry is toward the production of a great portion of the tonnage from a smaller number of better equipped mines operated by financially stable organizations. Though about 250 mines are in operation, no less than two-thirds of the tonnage comes from five mines operated by four companies. The proportion of the total tonnage produced by open-pit mines has increased rapidly. In 1929 almost half of the total tonnage came from surface mines; of this output more than 80 per cent was produced by three mines operated by two companies.

An important factor tending toward the stabilization of the industry has been closer co-operation between operators of lignite mines and power plants, either by common ownership or reciprocal contracts. The total capacity of central power stations located at, or close to, lignite mines has been increased and the mileage of high-tension electrical distribution systems extended during the year. The boiler plants of these stations are designed to burn lignite screenings economically.

The demand for screenings to supply the plants is now practically equal to the production of that size at most of the larger mines. Crushers have recently been installed at some of the tipples to crush run-of-mine to stoker size for the summer demand when the mine output is limited. Power plants at greater distances from the mines now find it profitable to burn the smaller prepared sizes rather than screenings, on account of the greater heat value delivered per dollar.

As in earlier years, the use of electric power in mining operations was extended in 1929. In underground mines progress was made in electric lighting and haulage and the use of motor-operated cutters. During the year one mine electrified its haulage. In the strip mines the newer stripping and loading shovels are operated either by electric motors or Diesel engines. Gasoline locomotives have been purchased to supplement or replace steam locomotives in strip operations. One strip mine, on account of the longer haul, has replaced its horse haulage with motor trucks.

Improvements in, or additions to, the screening facilities have been made at some mines in compliance with a growing demand for the smaller prepared sizes as household and stoker fuel. An unusually high percentage of the production of the state is used for domestic purposes, and for this reason the fines must be removed from practically the entire output. In the more distant markets, where competition with the higher rank Eastern coals is keen, preparation is especially important.

A commercial plant for the manufacture of carbonized lignite briquets was put in operation during the year with equipment that is nearly all of German design and manufacture. The fuel value of the product compares favorably with that of Eastern coals with which it must compete.

UTAH Broadens Mechanization

By OTTO HERRES
Assistant General Manager
United States Fuel Co.
Salt Lake City, Utah

FOR MANY YEARS Utah has been among the leading states in the application of progressive ideas to mining and safety practice.

Mining practice advanced by the application of improvements which past experience had already proved to be of value; no radical changes were made. Mechanization of underground operations was gradually extended. It is estimated that over a million tons, or more than 20 per cent of all the coal mined in the state, during 1929 was loaded mechanically. This tonnage is 20 per cent more than in 1928. Loading

machines of the tractor type, working under room-and-pillar methods, are more generally used than any others. Comparatively few pit-car loaders have been installed, and conveyors with or without duckbills have not been used, because coal for their operation cannot be provided in Utah so long as shooting is not permitted during the working shift.

Coal is being successfully loaded mechanically in the extraction of pillars in seams 16 to 24 ft. thick wherever roof conditions are favorable and the work is on a retreating panel basis. Hand miners extract the small stumps left by machines much as when pillars are removed under hand-mining methods. The recovery of pillars by scrapers after rooms have been driven with the aid of loading machines appears to be successful in coal of low or medium height where the roof is good.

Electric rotary drills are in general use in the preparation of coal for mechanical loading. A small-diameter cartridge of permissible powder was introduced during 1929 to lengthen or distribute the charge of explosive in the drillhole.

Gathering locomotives of both the cable-reel and storage-battery types are popular for haulage. During the year one mine, seeking increased speed so as to improve its service to its Joy loaders, installed a battery locomotive with additional cells.

A high and steadily growing proportion of the Utah output is sold for heating purposes and to a highly competitive and fastidious domestic market. To meet this condition the tendency has been to develop mines which have a flexible output with an abnormally high capacity during the winter months.

New installations are being equipped with double-roll breakers to reduce the size of large lump coal. Several companies purchased dropbottom cars. The Blue Blaze Coal Co. completed a 1,000-ton reinforced concrete storage bin between the dump and screening plant for the purpose of handling coal produced on idle days or on night shifts. Coal is dumped with dropbottom cars and taken from the bin to the screens by a belt conveyor.

In safety practice, the trend appears to be toward a more general application of rock dust throughout the mines in connection with sprinkling at the working faces. Hard-boiled hats were introduced extensively, and at some properties their use has been made compulsory.

A FEW Modernize; Others Retrench

By W. NORRIS COLE
Mining Engineer
Kentucky River Coal Corporation
Hazard, Ky.

MECHANIZATION made little progress in the Hazard field of southeastern Kentucky during 1829 because of the unfavorable market conditions which put many mines in the hands of receivers and caused the companies that survived to retrench heavily. However, one mine that had installed shaker conveyors has continued their operation, though a large part of the tonnage of the plant is still loaded directly by hand into the mine car. Similarly the Knott Coal Co. is still operating its Goodman shovel loader.

The Knott company recently installed a hydraulic separator at the mine for its egg and nut coal. This is now in successful operation. A pneumatic coal-cleaning plant has been erected by the same company at Ravenna, Ky., for cleaning slack, but this plant, though practically completed, is not yet running on a commercial basis. It is understood that the Ravenna plant will have sufficient capacity to handle slack from other mines in the field. As these are the two first mechanical cleaners installed in the Hazard field their effect on the sale of coal will be watched with much interest.

The South East Coal Co., at Seco, Ky., has been experimenting with a Northern mine-car loader for the past three or four months. Reports show that two face men of average ability will load from 40 to 45 tons per day with the loader. Heretofore, they have averaged 10 cars per day. However, the particular type of loader in use at this mine is too high for most of the workings in this territory, the coal not being thick enough for a high machine.

One of the largest mines in the Hazard field has been using short-wall machines and taking down 10 to 15 in. of top coal which has had to be gobbed. Now it is using an arcwall cutter and is cutting the coal immediately below the bone, which it leaves in the roof. As the machine men become better acquainted with the handling of these cutters good results are being obtained. Not only is a much cleaner grade of fine coal being procured but also a big saving is made by not handling the bone, which is held up in all except the main haulways. Several wood end-dump and rotary-dump cars have been replaced by steel cars with bottom dumps.

COMPLETE Mechanization Achieved

By EDWARD BOTTOMLEY
General Superintendent
Sheridan-Wyoming Coal Co.
Kleenburn, Wyo.

DURING the year 1929, northern Wyoming made no extensive advances in mechanization, for Sheridan County, with the exception of a few small wagon mines, was already 100 per cent mechanized. A Joy machine, however, has been added to the loading equipment at the Monarch mine to bring that operation up to an economical tonnage.

The mines in the Thermopolis district have not undertaken extensive mechanization, because of the natural condition in that field, the beds having a pitch of about 22 per cent. The Owl Creek Coal Co., however, has some pit-car loaders. It did not add any more of this equipment during the past year.

The Sheridan-Wyoming Coal Co. has standardized on Timken tapered roller bearings for pit cars and is adding 100 new wagons at each of its mines every year and will continue to do so until the old equipment has been entirely replaced. It will build the car bodies in its own well-equipped machine shops.

Strip mining is still being carried on by the Wyodak Coal & Manufacturing Co. in Campbell County, where the coal is 90 ft. thick. Nearly all the coal produced at this strip pit is used at the Homestake Mining Co.'s plant, Lead, S. D.

COAL SPENDS

+ Over Billion Dollars in 1929

THE COAL INDUSTRY of the United States spent in excess of $150,000,000 for materials and supplies necessary to the current operation of the mines of the country during the year just closed. This figure excludes all charges to the capital account for permanent improvements and betterment as well as payments for purchased power and for wages.

Mine workers, it is estimated, received not less than $850,000,000 in wages. This estimate is based upon data collected within the past few days by *Coal Age* from operations throughout the mining fields of the land. In addition, millions were spent in the purchase of merchandise for resale through company stores.

In other words, exclusive of expenditures chargeable to the capital account of the industry, the buying power of the industry, measured by the outlay in wages, materials and supplies, and merchandise for resale, was considerably in excess of $1,000,000,000.

The data collected by *Coal Age* indicate that the total expenditures for materials and supplies by the bituminous branch of the industry was over $108,000,000. Reduced to a per-ton basis this averaged 20.5c., as compared with the revised estimate of 25c. for 1928 and Census Bureau figures averaging 30.5c. per ton in 1919. The year 1919 was one of relatively high prices; with the exception of the boom year of 1920, the commodity price index was at its highest.

The reduction of 4.5c. in 1929 from the revised average of 25c. for the preceding year may be explained, in part at least, as the fruit of more efficient management and the result of the installation of bigger and sturdier equipment.

Returns had been received up to the time this issue of *Coal Age* went to press from all but seven of the coal-producing states of the country. These returns covered both commercial and captive operations, with the preponderance of reports from companies selling their coal in the commercial market. The estimated average of 20.5c. for the country as a whole was arrived at by weighing the totals for each state separately on the basis of actual reports from the operators in each state and the estimated output for each state during the past year. Using the estimate of 500,358,000 tons as the output for the year, this weighting gave $108,439,785 as the total expenditures for materials and supplies.

Of the returns received which gave data with sufficient detail to make the figures reported available for inclusion in the general compilations, 3.77 per cent of the returns were from companies producing 25,000 tons or less last year; 24.51 per cent from companies producing between 25,001 and 100,000 tons; 11.32 per cent from companies producing between 100,001 and 200,000 tons; 15.11 per cent from companies producing between 200,001 and 300,000 tons; 11.33 per cent from companies producing between 300,001 and 400,000 tons; 5.66 per cent from companies producing between 400,001 and 500,000 tons; 5.66 per cent from companies producing between 500,001 and 1,000,000 tons; 16.99 per cent from companies producing between 1,000,001 and 2,500,000 tons, and 5.66 per cent from companies producing in excess of 2,500,000 tons.

Expenditures for Material and Supplies by Bituminous Coal Mines

State	1929 Estimated Expenditures for Materials and Supplies: Estimated Production Net Tons	Average Per Ton,* Cents	Total for State**	1919 Actual Expenditures for Materials and Supplies: Actual Production Net Tons	Average Per Ton, Cents	Total for State
Alabama	17,013,000	43.0	$7,315,590	15,536,721	35.0	$5,420,177
Arkansas	1,802,000	16.5	297,330	1,429,020	50.0	716,615
Colorado	9,864,000	42.0	4,142,000	10,323,420	30.0	3,052,028
Illinois	60,009,000	10.5	6,300,945	60,862,608	25.0	15,345,498
Indiana	17,655,000	11.0	1,942,050	20,912,288	26.0	5,379,400
Iowa	4,087,000	13.0	531,310	5,264,692	31.0	1,758,025
Kansas	†	†	†	5,224,724	36.0	1,906,063
Kentucky	60,680,000	23.0	13,956,400	30,036,061	36.0	10,944,940
Maryland	†	†	†	3,021,686	31.0	929,325
Michigan	†	†	†	996,545	66.0	664,557
Missouri	†	†	†	3,979,798	35.0	1,381,223
Montana	†	†	†	3,236,369	37.0	1,183,810
New Mexico	2,669,000	41.0	1,094,290	3,138,756	31.0	975,742
North Dakota	†	†	†	840,959	34.0	283,633
Ohio	23,899,000	11.0	2,628,890	35,876,682	25.0	9,105,833
Olkahoma	3,241,000	16.5	534,760	3,802,113	37.0	1,391,771
Pennsylvania	137,246,000	25.0	34,311,500	150,758,154	30.0	44,912,367
Tennessee	†	†	†	5,213,205	40.0	2,036,127
Texas	901,000	16.5	148,660	1,690,656	23.0	387,935
Utah	5,262,000	42.0	2,210,040	4,631,323	34.0	1,564,955
Virginia	13,165,000	21.0	2,764,650	9,326,830	37.0	3,432,448
Washington	2,375,000	14.0	332,500	2,990,447	46.0	1,376,254
West Virginia	138,254,000	18.0	24,885,720	79,036,553	33.0	25,983,284
Wyoming	6,530,000	14.5	946,850	7,219,738	32.0	2,287,971
Totals for United States	‡525,358,000	20.5	$108,439,765	465,860,058	30.5	$142,432,551

*Averages derived from actual figures submitted *Coal Age* by operators.
**Estimated tonnage multiplied by average expenditure per ton.
†Included in totals for the United States.
‡Including other coal-producing states not specifically shown.

NEW TOPWORKS

✦ Construction Active in 1929

MECHANICAL CLEANING plants with a capacity in excess of 12,900 tons per hour were built by the coal industry of the United States in 1929. That such plants are yearly commanding more attention from the producers is amply shown by data collected by *Coal Age* direct from the field and also through the co-operation of the manufacturers of equipment. More than sixty separate installations were made or contracted for in the past year, ranging from a single machine for the cleaning of only one size to a fully equipped central plant capable of taking the production of several mines.

Based on a working day of eight hours and using the government figure of 308 days as the theoretical working year in the coal industry, the installed mechanical cleaning capacity is 31,786,000 tons. Actually, the total capacity will be in excess of that figure, as many operators plan to work these plants more than one shift or shifts longer than eight hours. Moreover, the data upon which the 12,900-ton figure is based do not include wet tables or jigs. Also, they do not purport to cover all the new construction during the last year.

Plants for handling coal by the ordinary screening and hand-cleaning methods kept pace with the construction of mechanically equipped installations. Data collected by *Coal Age* in this survey, covering a large part of the building activities of the year, showed installations with an hourly capacity of 22,300 net tons. This figure is exclusive of auxiliary coal-handling equipment installed in connection with new mechanical cleaning plants and, as in the case of the estimate on mechanical cleaning capacity, really understates the added capacity made available.

Pennsylvania retained its lead in the construction of new mechanical cleaning plants last year, outranking its nearest rival—West Virginia—by a comfortable margin. Four new Peale-Davis plants, with an aggregate capacity of 1,050 tons per hour, were built or started in the western part, and one each was begun in central Pennsylvania and southern West Virginia. Menzies hydro-separators, which have proved most popular in southern West Virginia, where seventeen installations were made last year, also went into other states.

Two new Rhéolaveur plants were built in southern West Virginia last year, with an aggregate capacity of 500 tons per hour. Pennsylvania also got one—capacity, 600 tons per hour—in addition to those completed last spring by the Pittsburgh Coal Co. One adventure in central cleaning made its bow in Kentucky last year, with an initial equipment of 75 tons per hour in American air tables. This plant, which is entirely away from the coal fields, will receive coal in railroad cars and prepare it for marketing. Alabama completed one small American air plant last year; southern West Virginia, three American and one Arms concentrator plants; Pennsylvania, one American and one Arms plant, and Ohio, one American air plant. Five installations of Link-Belt-Simon-Carves washers were made.

Anthracite operators, in the struggle to regain lost markets, took long strides in the construction of mechanical cleaning facilities last year. Capacity built or under way totaled nearly 8,200 tons per hour. The Philadelphia & Reading Coal & Iron Co. took the lead by starting the construction of two new central breakers at Locust Summit and Gilberton, Pa. Both are equipped with Chance cones having an aggregate capacity of 3,440 tons per hour. The Hudson Coal Co. completed the Marvine breaker at Scranton, and the Gravity Slope breaker at Archbald, Pa., adding 1,200 tons per hour to its mechanical cleaning capacity. This company also constructed a Chance washery having a capacity of 200 tons per hour at Middletown,

New Topworks Construction in 1929†

Coal Company	Plant Location	Total Capacity Tons per Hour	Preparation Equipment
Allegheny River Mining Co.	Furnace Run, Pa.	2,000*	Roberts & Schaefer
Algoma Coal & Coke Co.	Algoma, W. Va.	100	Roberts & Schaefer[3]
Alston Coal Co.	Pittsburg, Kan.	350*	United
American Coal Co. of Allegany County	McComas, W. Va.	....	American[1]
	McComas, W. Va.	100	Roberts & Schaefer[3]
American Rolling Mills Co.	Nellis, W. Va.	2,000*	Rheolaveur
Ashland Coal & Coke Co.	Ashland, W. Va.	150	Pittsburgh C. W
Ashless Coal Sales, Inc.	Lexington, Ky.	75	American[1]
Benedict Coal Corporation	St. Charles, Va.	1,200*	....
Bon-Jellico Coal Co.	Bon Jellico, Ky.	125	Morrow
Buckeye Coal Co.	Brier Hill, Pa.	200	Pennsylvania M.M.[2]
	Nemacolin, Pa.	600	Rheolaveur
Buckeye Coal & Coke Co.	Devils Fork, W. Va.	150	Kanawha
Butler Consolidated Coal Co.	Wildwood, Pa.	300	Pennsylvania M. M.[2]
Calumet Fuel Co.	Delcarbon, Colo.	2,500*	....
Carbon Fuel Co.	Carbon, W. Va.	250	Fairmont[2]
Carroltown Coal Co.	St. Benedict, Pa.	100	Fairmont[2]
Central Alabama Coal Co.	Kimberly, Ala.	25	American[1]
Central Indiana Coal Corporation	Linton, Ind.	100	Link-Belt[6]
Central Pocahontas Coal Co.	Anawalt, W. Va.	25	American[1]
Centralia Coal Co.	Centralia, Ill.	400	Morrow
Chartiers Creek Coal Co.	Canonsburg, Pa.	120	Roberts & Schaefer[3]
Clinchfield Coal Corporation	Dante, Va.	2,000*	....
Clinton Block Coal Co.	Imperial, Pa.	150	Roberts & Schaefer[3 5]
Consolidated Coal Co. of St. Louis	Mt. Olive, Ill.	450	Link-Belt
Consolidated Indiana Coal Co.	Williamson, Ia.	2,500*	Pittsburg B. & M.

N. Y., for preparing coal in storage.

The Glen Alden Coal Co. completed the second half of the Rhéolaveur installation in the Loomis, Pa., breaker. The Lehigh Valley Coal Corporation began the construction of a new Rhéolaveur breaker of 400 tons per hour capacity, at Wilkes-Barre, Pa. The Lehigh Coal & Navigation Co. installed a Rhéolaveur of 50 tons per hour capacity at Hazleton and a Hydrotator (50 tons per hour) at Coaldale, Pa.

Most of the new installations of 1928 are shown in the accompanying table, which gives the name of the operating company, the location of the plant and its capacity in tons per hour. Where construction included the installation of a mechanical cleaning plant, that fact and the system installed is indicated, though not in all cases does the total capacity consist entirely of the particular equipment mentioned.

The summary was made possible through the co-operation of the following manufacturers of equipment (abbreviations given in the table follow the names in parentheses): Link-Belt Co. (Link-Belt); Jeffrey Manufacturing Co. (Jeffrey); Koppers-Rhéolaveur Co. (Rhéolaveur); Pittsburg Boiler & Machine Co. (Pittsburg B. & M.); Roberts & Schaefer Co. (Roberts & Schaefer); Fairmont Mining Machinery Co. (Fairmont); Chance Coal Cleaner (Chance); Morrow Manufacturing Co. (Morrow); United Iron Works, Inc. (United); American Coal Cleaning Corporation (American); Webster & Weller Manufacturing Cos. (Webster); Pittsburgh Coal Washer Co. (Pittsburgh C. W.); Kanawha Manufacturing Co. (Kanawha); Heyl & Patterson Co. (Heyl & Patterson); Pennsylvania Mining Machinery Corporation (Pennsylvania M. M.), and the Allen & Garcia Co.

Plants providing for screening and hand-picking of coal had their greatest growth in the Southwest, as compared to facilities existing prior to 1929. Ten new plants were built in Kansas, Arkansas, and Missouri, with an aggregate capacity of 1,100 tons per hour. In the Middle West region, new plants were largely constructed in connection with stripping operations. Kentucky operators, with the exceptions noted above, largely confined their efforts to the installation of screening facilities, as did those in Virginia. Several plants of this type also were built in West Virginia, particularly in the northern part, and in Pennsylvania.

New Topworks Construction in 1929—*Continued*

Coal Company	Plant Location	Total Capacity Tons per Hour	Preparation Equipment
Consolidation Coal Co.	Rivesville, W. Va.	350	Fairmont
	Acosta, Pa.	300	Fairmont[2]
Cornell Coal Co.	Pittsburg, Kan.	800*	United
Crab Orchard Improvement Co.	Eccles, W. Va.	200	Fairmont[2]
Cullen Fuel Co.	Plymouth, Pa.	150	Chance
Detroit Mining Co.	Gordon, W. Va.	100	Roberts & Schaefer[3]
Dragon Coal Co.	Morgantown, W. Va.	125	Morrow
Ebensburg Coal Co.	Colver, Pa.	300	Webster
	Colver, Pa.	300	Webster
Ed. Brennan Coal Co.	Pittsburg, Kan.	350*	United
Elk Horn Coal Corporation	Haymond, Ky.	300	Fairmont
Ellsworth Collieries Co.	Ellsworth, Pa.	650	Roberts & Schaefer
Empire Coal & Coke Co.	Landgraff, W. Va.	50	Roberts & Scahefer[3]
Ennis Coal Co.	Hiawatha, W. Va.	50	Roberts & Scahefer[3]
	Hiawatha, W. Va.	60	Roberts & Scahefer[5]
Erie Canal Coal Co.	Boonville, Ind.	1,000	.....
Essex Coal Co.	Hocking, Ohio	60	American[1]
French York Coal Co.	Pittsburg, Kan.	300*	United
Glen Alden Coal Co.	Loomis, Pa.	4,000*	Rheolaveur
Glogora Coal Co.	Red Dragon, W. Va.	250	Fairmont
Greenbrier Coal & Coke Co.	McDowell, W. Va.	70	American[1]
Gulf Smokeless Coal Co.	Covel, W. Va.	50	Roberts & Schaefer[3]
Hazle Brook Coal Co.	Centralia, Pa.	150	Chance
Hillman Coal & Coke Co.	Jerome, Pa.	50	Roberts & Schaefer[3]
Hocking Valley Mining Co.	Hocking, Ohio.	50	Roberts & Schaefer[3]
Howell & Sill.	Antrim, Pa.	125	Morrow
Hudson Coal Co.	Archbald, Pa.	400	Chance
	Middletown, N. Y.	200	Chance
	Scranton, Pa.	800	Chance
Hume-Sinclair Coal Co.	Hume, Mo.	800*	United
Humphreys Coal & Coke Co.	Greensburg, Pa.	100	American[1]
Juanita Coal & Coke Co.	Bowie, Colo.	4,000*	Pittsburg B. & M.
Jeddo-Highland Coal Co.	Jeddo, Pa.	300	Chance
	Freeland, Pa.	150	Chance
	Harleigh, Pa.	300	Chance
Keystone Mining Co.	East Brady, Pa.	1,000*	.....
Killarney Smokeless Coal Co.	Killarney, W. Va.	300	Kanawha Roberts & Schaefer[3]
Knott Coal Co.	Anco, Ky.	50	Roberts & Schaefer[3]
Koppers Coal Co.	Carswell, W. Va.	250	Rheolaveur
Langcliffe Collieries, Inc.	Avoca, Pa.	200	Chance
Lehigh Coal & Navigation Co.	Coaldale, Pa.	50	Hydrotator
	Hazleton, Pa.	50	Rheolaveur
	Kaska, Pa.	175	Chance
Lehigh Valley Coal Corporation	Wilkes-Barre, Pa.	400	Rheolaveur
Liberty Coal Co.	Paris, Ark.	500*	United
Lincoln Gas Coal Co.	Lincoln Hill, Pa.	350	Fairmont[2]
Lorain Coal & Dock Co.	Bridgeport, Ohio.	500	Morrow
	Bridgeport, Ohio.	400	Morrow
	Bridgeport, Ohio.	400	Morrow
Mallory Coal Co.	Mallory, W. Va.	75	Roberts & Schaefer[3]
Manor Coal Co.	Vindex, Md.	250	Roberts & Schaefer[3]
Mead Smokeless Coal Co.	Vanwood, W. Va.	50	Roberts & Schaefer[3]
C. H. Mead Coal Co.	East Gulf, W. Va.	100	Roberts & Schaefer[3]
Merrill Mines, Inc.	Henlawson, W. Va.	200	American[1] Pittsburg, C. W.
Minden Coal Co.	Minden Mines, Mo.	500*	United
E. C. Minter Coal Co.	Francis, W. Va.	100	Roberts & Schaefer[3]
Munsen-Bache Coal Co.	Fiatt, Ill.	600	Morrow
New River Co.	Macdonald, W. Va.	400	Pittsburgh C. W.
	Macdonald, W. Va.	350	Pittsburgh C. W.
New River & Pocahontas Consolidated Coal Co.	Minden, W. Va.	150	Link-Belt[6]
New Shockley Coal Co.	Paris, Ark.	500*	United
Ohio & Indiana Coal Co.	Linton, Ind.	200	Morrow
Patoka Coal Co.	Winslow, Ind.	3,000*	Link-Belt
Pennsylvania Coal & Coke Co.	Cresson, Pa.	100	Roberts & Schaefer[3]
Philadelphia & Reading Coal & Iron Co.	Locust Summit, Pa.	1,440	Chance
	Gilberton, Pa.	2,000	Chance
Pittsburgh Coal Co.	Pittsburgh, Pa.	125	Morrow
Pittsburgh & Erie Coal Co.	Erie, Pa.	150	Webster
Pittsburgh Terminal Coal Corporation	Coverdale, Pa.	800	Heyl & Patterson
Pittsburg & Midway Coal & Mining Co.	Pittsburg, Kan.	1,500*	United
Peerless Coal Co.	Peerless, Utah.	700	Pittsburg B. & M.
Perry-Hannibal Coal Co.	Perry, Mo.	2,500*	Pittsburg B. & M.
Point Mountain Coal Co.	Webster Springs, W. Va.	500*	.....
Pond Creek Pocahontas Co.	Bartley, W. Va.	250	Roberts & Schaefer[3]
Potter Coal & Coke Co.	Greensburg, Pa.	150	Link-Belt
Pursglove Mining Co.	Pursglove, W. Va.	400	Roberts & Schaefer
Rail & River Coal Co.	Bellaire, Ohio	400	Morrow
Rochester & Pittsburgh Coal Co.	McIntyre, Pa.	500	Heyl & Patterson
Rock Lick Smokeless Coal Co.	Concho, W. Va.	200	.....
Rosedale Coal Co.	Morgantown, W. Va.	2,000*	.....
Sharon Coal & Coke Co.	Sharondale, Ky.	250	Roberts & Schaefer
Sherwood-Templeton Coal Co.	Linton, Ind.	400	Link-Belt[6]
Stalter & Essex Mining Co.	Hobson, Ohio	50	Roberts & Schaefer[3]
Standard Coal Co.	Standardville, Utah.	400	Link-Belt
Standard Fourth Vein Coal Co.	Linton, Ind.	125	.....
Stephenson-Finnimore Coal Co.	Pittsburg, Kan.	800*	United
Stevens Coal Co.	Wilkes-Barre, Pa.	800*	Chance
Stonega Coke & Coal Co.	Sun, W. Va.	50	Roberts & Schaefer[3]
Sullivan Coal Co.	Paris, Ark.	500*	United
Superfuel Co.	Paris, Ark.	500*	United
Truax-Traer Coal Co.	Elkville, Ill.	5,000*	Pittsburg B. & M.
	Holidaysboro, Ill.	500	Pittsburg B. & M.
	St. Daid, Ill.	4,000*	Pittsburg B. & M.
United Electric Coal Cos.	DuQuoin, Ill.	1,000	Jeffrey
United Pocahontas Coal Co.	Crumpler, W. Va.	4,000*	American[1] Link-Belt[6]
Valley Mining Co.	Nelsonville, Ohio	150	Roberts & Schaefer[3]
W. J. Rainey, Inc.	Allison, Pa.	250	Link-Belt
	Fredericktown, Pa.	400	Morrow
	Uniontown, Pa.	300	Morrow
Wacomah Coal Co.	Amigo, W. Va.	50	Roberts & Schaefer[3]
Wasson Coal Co.	Carrier Mills, Pa.	400	.....
Weir-Cherokee Coal Co.	Pittsburg, Kan.	800*	United
West Virginia Coal & Coke Corporation	Norton, W. Va.	400	.....
	Stirrat, W. Va.	500	Link-Belt
Wheeling & Lake Erie Coal Mining Co.	Fairpoint, Ohio.	135	Link-Belt[6]
Wise Coal & Coke Co.	Dorchester, Va.	200	Morrow
Yolande-Connellsville Coal Corporation	Yolande, Ala.	2,000*	.....

[1]American air tables; [2]Peale-Davis air tables; [3]Menzies Hydro-Separator; [4]Hydrotator; [5]Arms air concentrators; [6]Link-Belt-Simon-Carves washers.

*Tons per day.

†Also includes new major installations of preparation equipment in existing structures.

The BOSSES

Out of a Job At 45

"LOOK at this," directed the Super, passing a letter across his desk to Mac.

The foreman read through its contents and then looked up. "Is this an order? Does the Old Man mean that from now on we can't hire any new men over 45 years old?"

"I guess he does," answered Jim.

"Why, he must be getting childish or else he's forgetting his debt to the men who made him."

"Not that exactly," put in the Super. "He remarked to me some time ago that one big company had set an age limit and he wondered if that might not be a good idea."

"A good idea is right, Jim—to gum the works. Maybe our men wouldn't show their resentment right now, because running time is slack. But you can just bet that our machine would eventually break down. Men would begin to worry; accidents would jump up and efficiency down. Besides, some of our best men, taking it all around, are over 50. Some mighty good men past the mark are looking for work for no reasons of their own making."

"I know," replied Jim quietly. "There's the moral obligation we owe society to be considered too, and the effect of the move on the community. Strange, isn't it, that men up in years, who intend to stay on the job themselves, will issue such orders? Tell Dad he's too old to work and watch him jump."

"Jim, we've got to do something about this. We'll stick to the men in this fight. Maybe we can work up a plan to satisfy the boss."

WHAT IS TO BE DONE?

How would you handle the situation?

Can you illustrate by actual cases?

Have you a plan?

Does a company lose by retaining older men?

All superintendents, foremen, electrical and mechanical men are urged

Talk It Over

Variety of Problems Presented for Solution In Multiple Shifting

Jim's Idea on Multi-Shifting Cannot Be Used at Present

I CAN well imagine the reception Jim's proposal of changing shifts at intervals of four hours will get in the minds of typical mine officials. They won't see it at all; yet there is something in it, at least for the future. If the mine boss takes this proposal as applying to working conditions as they exist today, he is right in scoffing at it. Working areas today, even where concentrated mining is practiced, are too large for the application of the factory methods on which Jim's idea is based. Concentration is a relative term, and the working area of tomorrow may be only a half or a third of the concentrated section of today for a given tonnage. Under the conditions of so great a degree of concentration, Jim's plan would work out nicely.

Men engaged in certain phases of the underground work might well start their work in the middle of the regular working shift, providing they can reach their places without the danger of being injured by the haulage units. But as a regular thing, the scheme is not practical.

Pittsburgh, Pa. G. M. B.

Leave Time for Repairs

MULTIPLE shifting of mechanical loaders certainly does involve a number of different factors. One cannot help but ask why, if single-shifting a mechanical loader will produce 200 tons, double- or triple-shifting should not double or triple the tonnage and thus reduce the overhead.

In order to successfully work a multiple shift, I believe one must establish the following procedure: First, detail how the working shift shall leave the section for the incoming shift. Second, require a report at end of each shift on the mechanical condition of loader. Third, have the face mechanics inspect and repair at once all mechanical trouble reported. Fourth, give the mechanical loader proper lubrication by a special greaser between shifts. Fifth, leave time between shifts for lubrication and repairs, also, for any irregularities on the section.

After double-shifting our loaders for a year without a recess between the day and the night shift, we finally changed our shift schedules to give some time between them. One shift starts at 7:30 a.m. and quits at 4 p.m. The second shift starts at 7:30 p.m. and quits at 4 a.m. This schedule gives us 3½ hours between shifts. We have found that the establishment of a recess between shifts has increased the production per loader per shift by 6.2 per cent.

Cadiz, Ohio. A. J. RUFFINI.

Why Complicate Matters?

JIM'S idea is somewhat like that held by the baseball team which lost its big game of the season by poor hitting because it thought the much-advertised pitcher would surely throw fancy curves, whereas he really stuck to a straight delivery. He is trying to solve an ordinary problem by developing a long and complicated formula when simpler methods would produce better results.

With the exception of repairmen and oilers, I think the entire crew should go on shift at one time. By doing this, the men may all go in on one man-trip if the face is sufficiently distant to warrant riding in. Having only two full shifts personnel, the psychology of change and accompanying disruption of continuity will be minimized.

If efficiency and low cost are the major objectives, no more than two loading shifts will be found to be practicable. This will make it possible to have a lunch period and ample time between shifts for oiling and maintaining the machines. By starting a full crew at, say, 7 a.m. and one at 7 p.m., with a face boss in charge of each unit, supervision will be more effective. Face bosses should make a detailed daily report to the mine foreman.

Mac will find that unless shooting during working shifts is permissible, he will need more than one extra place for each machine. In fact, if he wants a high production every day, he will find under average conditions that he will need approximately twice as much face as the machine will clean up in a shift. An extra number of places is needed to take care of unusual delays and other difficulties.

Time studies should be applied with a great deal of care, both before and after the system of double-shifting is instituted. The stop watch, intelligently applied, eliminates guesswork. In any case, the use of scientific or common-sense methods must be applied with one idea constantly in mind, namely that the loading machine is the only part of the system which pays a dividend, and that minor operations must be sacrificed sometimes to keep the machine producing.

Central City, Ky. C. H. FARMER.

Use One Mine Foreman Only To Fix Full Responsibility

IN THE solution of Jim's last problem regarding multiple shifting, I would schedule only two shifts every 24 hours. More than two would delay haulage and other operations in mines that are worked in to a great distance. The scheme proposed by Jim of sending in crew after crew about every four hours would involve too great a hazard in the transportation of men to their working places, with the mine in full operation. Rather than split the crews it would be better to train them to work together.

By all means put one foreman in full charge throughout the 24 hours, giving him capable assistants for each of the working shifts. It is seldom that you can get two men so equally matched as to allow the splitting of responsibility

Influence of Travel

If Mac and Jim could visit and inspect your mine, you and they together would benefit. Again, if you were allowed the opportunity of giving their plant the "once-over," the gain would be mutual. Nothing sharpens the penetration of man's observation and deduction quite so effectively as travel. Yet many overlook this helpful resort. It is not necessary always to cover distance in order to travel profitably.. This, at least, is true in business, where distance is merely a necessary waste of time. It is the subject, rather than the distance covered to reach it, that counts. Today everyone has an equal opportunity to travel the globe of business and industry in the printed word. By reading and by contributing to these pages you, Mac and Jim are privileged to journey far and wide in the realm of your job.

to discuss these questions. Acceptable letters will be paid for

between them. With a division of foremanship between two men, neither would take interest in the affairs of operation influencing the work of the other.

I do not think it practical to try to work underground operations on the plan followed by factories. Constant changing of men is barred by the great distances from the mine portal to the working faces.

Eldorado, Ill. R. A. BARTLETT.

Publications Received

Explosions and Other Accidents From Mudcapped Shots in Coal Mines, by D. Harrington and C. W. Owings. Bureau of Mines, Washington, D. C. Information Circular 6,158; 5 pp.

Signalling from Cages at Rest or in Motion, by D. J. Parker and R. I. C. Manning. Bureau of Mines, Washington, D. C. Information Circular 6,161; pp. 7, illustrated.

Coal Washing Investigations—Methods and Tests, by H. F. Yancey and Thomas Fraser. Bureau of Mines Bulletin 300, Washington, D. C.; 259 pp., illustrated; price, 50c. A study of the washing characteristics of bituminous coals, the major part being conducted by the Bureau of Mines in co-operation with the Engineering Experiment Station of the University of Illinois and the Illinois Geological Survey Division.

The Ignition of Firedamp, by H. F. Coward and R. V. Wheeler. Safety in Mines Research Board, Paper No. 53 (A revision of S.M.R.B. Paper No. 8, 1925), pp. 40; illustrated; price, 6d. net. H. M. Stationery Office, Adastral House, Kingsway, London W. C. 2, England. Summarizes present knowledge of conditions under which various forms of heat application reach the combined intensity and duration necessary to cause ignition of various inflammable mixtures of firedamp and air.

The Ignition of Firedamp by the Heat of Impact of Metal Against Rock, by M. J. Burgess and R. V. Wheeler. Safety in Mines Research Board. Pp. 25; illustrated; price, 6d. net. H. M. Stationery Office, Adastral House, Kingsway, W. C. 2, London, England. Gives an account of experiments made to determine whether firedamp can be ignited by a single blow of a hand pick or by the repeated impacts of coal-cutter picks against hard rock.

Seventh Annual Report of the Safety in Mines Research Board, including a report of matters dealt with by the Health Advisory Committee, 1928. Pp. 88; illustrated; price, 1s. net. H. M. Stationery Office, Adastral House, Kingsway, W. C. 2, London, England.

Inspection and Testing of Mine-Type Electrical Equipment for Permissibility, by L. C. Ilsley, E. J. Gleim, H. B. Brunot. Bureau of Mines, Washington, D. C. Bulletin 305. Price, 10c. Pp. 26; illustrated. Discusses the theory upon which tests of equipment in explosive atmospheres are based and covers inspection and other matters pertaining to complete investigations of machines under Schedules 2B and 15.

American Standards Year Book, 1929. American Standards Association, New York City. Pp. 88. Covers important developments in the national standardization activities of almost every major industry in America, including mining.

Make Track Crews Larger, Not Smaller, Suggested

I AM NOT in sympathy with Jim's plan to cut down the track crew from two to one man. Consider the operation of changing a rail. In this job one man can clear refuse from the ties and remove the joint splices while another is pulling up the spikes. In actually moving the rail into position one man cannot work very well alone, as a single rail section may weigh between 400 and 600 lb. In re-spiking it is customary, and practically necessary, for one man to hold the tie firmly against the rail while the other drives the spikes.

If the rail requires bending, one man will have great difficulty in putting any kind of a bend in a rail weighing 40 lb. or more. The unit containing more than one man has the advantage of providing a surplus of trained men who can be used to fill vacancies in the job of track layer.

I am more in favor of increasing the main track units to a point where it will be economical to provide an overseer who can be held responsible for the work. The smaller the crew, the more inadequate the supervision. It has always been my contention that track work should be more systematically planned, to the end of eliminating the delays due to derailments and of avoiding the necessity for track men spending a large part of their time in traveling from one isolated point to another, merely to patch the track as derailments are reported. It is this lost motion which pyramids the cost.

Pennsylvania. A SPECIALIST.

More and Shorter Shifts Will Help Mechanization

I HAVE FELT for years that multiple shifting, now up for discussion in *Coal Age*, would some day come to pass. Prof. Henry Louis, of the Armstrong College, Newcastle on Tyne, Northumberland, England, has always laid great stress on this feature of mine operation. In England, mining machines, as well as hoisting engines, are worked night and day, six days a week, at many mines. An idle machine represents idle capital. The budgets covering mine operation cannot be balanced if the equipment be not kept constantly at work.

In this country it is not unusual for a mine to work only 125 days in a year. At this rate, if the machines are operated only one shift each day, they are making a return on the investment during less than 12 per cent of the time for which the investment charges are computed. It is time that something was done about the discrepancy.

Jim's ideas of multiple shifting in mechanized mining are practicable, being the foundation of an ideal all operators should strive to bring about. Multiple shifting becomes increasingly more necessary because more expensive and more complicated machinery is being introduced into mining. Machine design also is changing at a more rapid rate, which means that the units become obsolete in a shorter period of time than before.

Mechanization of the coal industry is speeding up the time when the operator will have to consider and adopt shorter working hours for his men. It is fast bringing about an unemployment situation which can be met only by cutting down the number of hours per working shift and increasing the number of employees.

Some will say, send the surplus of labor to other industries. That is more easily said than done, for those other industries, too, are faced with the same problem. When the cry was first raised, immediately after the World War, for a six-hour day for the miner, I was not in sympathy with it, but subsequent trends of industrial events have converted me to belief in its inevitability. Shorter working shifts and more of them are the solution.

Linton, Ind. W. H. LUXTON.

Trade Literature

Focusing Systems for Engineering and Surveying Instrument Telescopes (erecting and inverting), 12 pp., illustrated, and Transits and Levels, 20 pp., illustrated, are two bulletins issued by C. L. Berger & Sons, Inc., Boston, Mass.

Utility Gyrating Screen; Simplicity Engineering Co., Durand, Mich. Catalog No. 31-G, 11 pp., describing use for wet, damp or dry material; also speed in separation, economy of operation and construction.

Fuel Burning and Steam Generating Equipment; Combustion Engineering Corporation, New York City. General condensed catalog GC-5, 16 pp., illustrated, describing the more important fuel-burning and steam-generating equipment manufactured by this company. A complete list of C-E products is included.

Pumps—rotary, centrifugal, triplex and spray, are illustrated and described in Catalog 28, 216 pp., issued by the Deming Co., Salem, Ohio. Statistics and wiring diagrams are included.

The following bulletins have been issued by the Elliott Co., Jeannette, Pa.: L-2, 44 pp., describing the new features of its 3,500 r.p.m. induction motors; L-3, 44 pp., covering special type of synchronous motor with added flywheel effect furnished for compressor drive; A-4, 24 pp., giving information on various types of strainers. These bulletins are all illustrated.

"Conveyor Mining Hints" is the title of Bulletin M-3, 20 pp. (illustrated), issued by the Conveyor Sales Co., Inc., New York City. Data on the application of conveyors in the mines are given.

Squirrel-Cage Motors are illustrated and described in the 24-pp. Bulletin 165 of the Wagner Electric Corporation, St. Louis, Mo. Besides the seven types of squirrel-cage motors covered, cost, performance and delivery are discussed.

First-Aid Kits; Bullard-Davis, Inc., San Francisco, Calif. Four-page folder illustrating and describing the various first-aid products manufactured by this concern.

Continuous Centrifugals; Elmore Centrifugal Products Corporation, St. Louis, Mo. The construction and economies effected in operation are illustrated and described in this 4-pp. folder.

Flexible Couplings; the Poole Engineering & Machine Co., Baltimore, Md.; pp. 36, illustrated. Operation, installation, lubrication and maintenance are described.

Simon-Carves system of coal washing is described in Book No. 1,042, 8 pp., illustrated, by James D. S. Drinkwater, entitled "Improving Coal Preparation," and issued by the Link-Belt Co., Chicago, Ill.

Mine Car Air Compressors; Chicago Pneumatic Tool Co., New York City. Bulletin 750 (fourth edition), pp. 7; illustrated. Describes the construction and advantages of these machines.

OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

Sand Is Conveyed 200 Ft. by Air Upgrade Through 2-In. Pipe

AT EUREKA NO. 40 MINE, Windber, Pa., the Berwind-White Coal Mining Co. has a locomotive sand handling layout in which the dried sand is elevated 30 ft. and conveyed 200 ft. by air pressure to a 19-ton steel bin that serves two mine tracks.

In Fig. 1, *A* is the sand house, *B* is the straight line of 2-in. extra heavy conveying pipe, and *C* the locomotive sanding station.

Fig. 2 shows the top of the sending cylinder, which extends 6 ft. into the ground below the floor of the sand drying house. This cylinder is a piece of 20-in. high-pressure pipe capped at the ends. It is located within a few feet of the sand drier.

When the cylinder is to be filled with dried sand, the air pressure is shut off by closing valve *E*, and the cock *F* is opened to insure that no pressure remains in the cylinder. The plug *A* is then removed and the hopper or funnel *D* is swung into position over the hole. The screen lying at the left is placed on top of the hopper to remove any large material from the sand as it is shoveled into the hopper for charging the cylinder. After the cylinder has been filled, the plug *A* is replaced, cock *F* is closed and the compressed air admitted by opening valve *E*. The dry sand is forced up through the 2-in. pipe *B* which, from the top of the sand house, extends overhead to the steel bin.

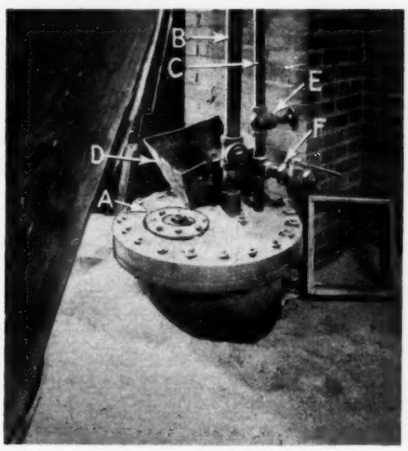


Fig. 2—Top of Sending Cylinder Beside Sand Drier

The sketch Fig. 3 indicates the approximate arrangement of the pipes in the cylinder. The air-supply pipe does not terminate at a nozzle in the bottom of the sand discharge pipe to produce an injector effect, as might be expected. Instead it extends only about 2 ft. into the cylinder. The open end of the sand discharge pipe is about 4 in. above the bottom of the cylinder.

Air for the sand conveyor and for use in a blacksmith shop is supplied by an 8x8 compressor driven by a 10-hp. motor. The pressure range is 50 to 90 lb.

The 19-ton bin, Fig. 4, is equipped with four pieces of hose for conducting the sand into the locomotive boxes. Instead of controlling the flow with a valve, it is done by raising or lowering the end of the hose. The two pieces of hose extending parallel to the track are held out of the way by hooks but the other two have the ends attached

Fig. 1—Sand House, Conveyor Pipe, and Sanding Station

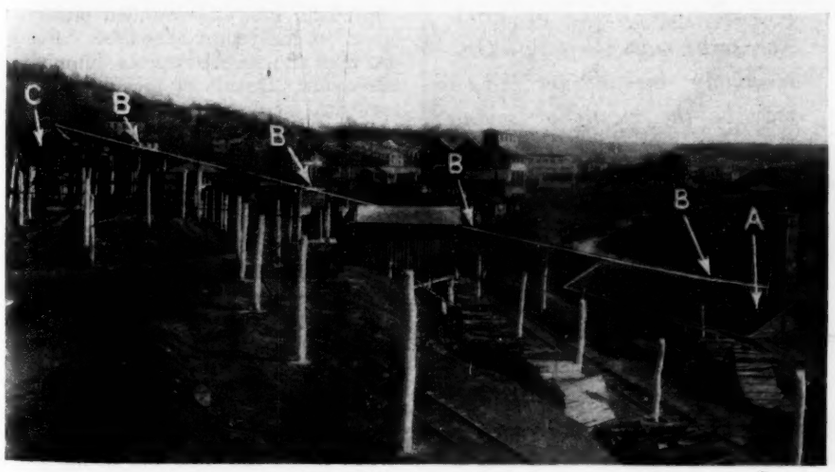
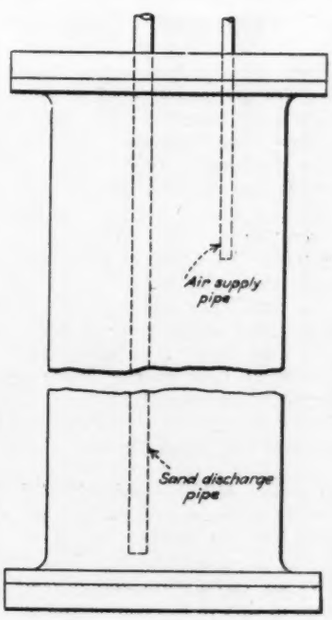


Fig. 3—Pipe Arrangement in Cylinder



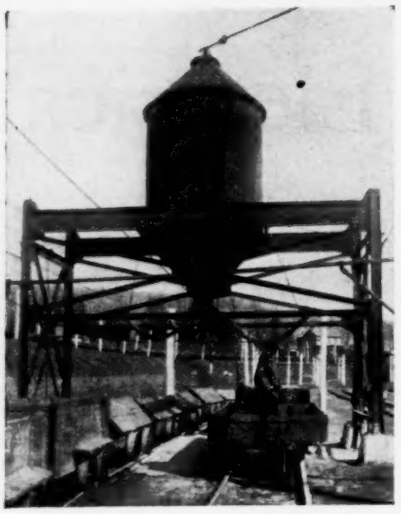


Fig. 4—Nineteen Tons of Dry Sand on Tap

to counterweighted ropes. In wet weather the sand clogs at times in the hose but is easily loosened by poking with a rod. This disadvantage apparently is of little consequence; otherwise the open ends would be fitted with caps of some kind.

The 2-in. extra-heavy steel pipe which conveys the sand wears out in about a year. To reduce wear and minimize the chance of clogging, it is important to have as few bends as possible in the pipe. In the few instances of clogging that have happened in several years of operation, the flow was started by tapping the pipe with a hammer. When the mines are working to capacity the system handles about four carloads of sand per month.

Confined Heat Injures Battery Cells

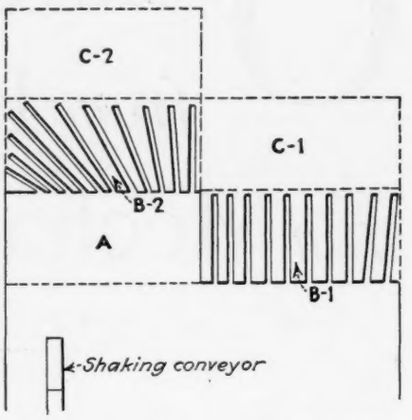
When battery locomotives were installed for gathering coal in mines of the Spruce River Coal Co., Ramage, W. Va., they were purchased equipped with Edison batteries. Only recently have these original batteries reached the point of service where general overhauling and replacement of some of the cells is necessary. In doing this work, A. E. Harris, chief electrician, noted that the cells around the sides of the battery compartment were in much better condition than those near the center. In his opinion heat is the cause of this more rapid deterioration.

To correct the condition, he is rebuilding the compartments. Originally the compartments were floored solidly with wood. When overhauling the batteries, he removes this solid wood flooring and cuts a number of 3-in. round holes in the steel bottom. This change allows air circulation and prevents collection of dirt in the compartment.

Anthracite Blasting Idea Protects Conveyor

Mechanical mining of anthracite is attended by many difficulties, not the least of which is the blasting of this coal. The application of machines for cutting anthracite has not yet proved entirely successful and, in consequence, the coal must be shot off the solid. When materials-handling machines are used, notably conveyors, larger quantities of coal must be provided for loading during any one cycle. This means that more holes must be drilled and fired in preparation for loading. When conveyors are installed near the face, they must be kept at that point during the blasting operation, because moving them back would require too much time and effort. When kept within close proximity to the face, the equipment is exposed to damage by flying coal blasted off the solid. Especially is this true in the case of chamber mining with conveyors.

Frederick Neuman, Scranton, Pa., submits a scheme of blasting that minimizes the flying of coal in a direction lateral with the chamber. The method is shown in the accompanying illustration. After a chamber has been widened out and its face advanced sufficiently to accommodate a shaking conveyor, but before this unit is installed, the pocket



Stepped Faces for Blasting off Solid

A is blasted half way across the face. Then the conveyor is installed, and by means of it the coal is removed from this initial pocket.

The next step is to drill and to charge the two half faces designated as *B-1* and *B-2*, these two faces being stepped as shown. Together, they constitute one loading task. First of all the holes in the face *B-1* are fired, which causes the coal to move in the direction of and to occupy the territory marked *A*. During that blasting operation, obviously the conveyor is not exposed to damage. Now, the face or pocket *B-2* can safely be fired or blasted. The coal released by this group of holes will be stopped by the barrier of loose coal lying in area *A* and thus be prevented from reaching and damaging the conveyor, or from knocking out timbers set near the face. This coal having been loaded out, the half faces *C-1* and *C-2* are similarly blasted.

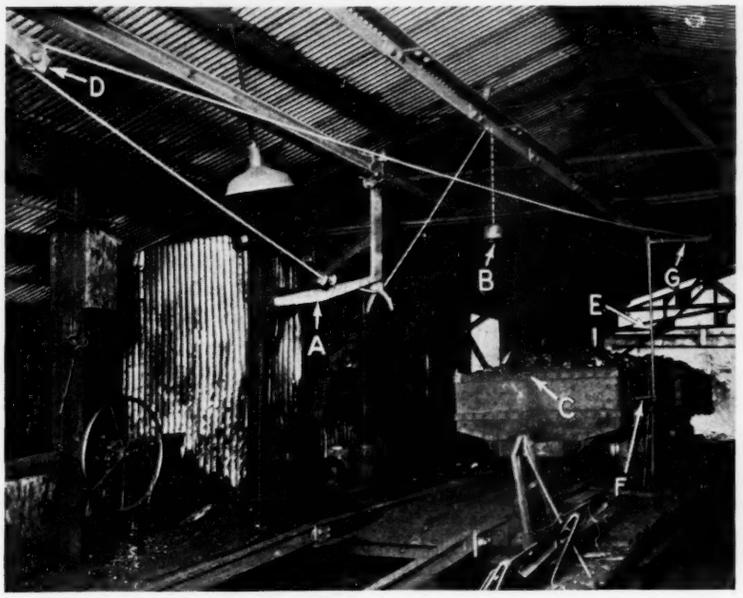
Meeting Emergencies

When time is of essence, as always it is in emergencies, borrowed ideas, plus ingenuity in applying them, must be relied upon to cut delays in plant operation to a minimum. It is on these occasions that the operating ideas appearing in this issue and in other issues of COAL AGE *serve most usefully. One seemingly insignificant idea may be the means of saving lives and dollars. Consequently, it is important that this mass of information be made as complete and up to date as possible. Send in your ideas, illustrated by a photograph or a rough sketch. Those accepted for publication are paid for at a minimum rate of $5.*

Automatic Gate Lifter Speeds Dumping

A device conceived by William Ferguson, outside foreman of the Ocean mine, Pittsburgh Coal Co., Smithdale, Pa., and installed under his direction, has reduced the labor force by one man and speeded up the dumping of mine cars. Details of this device were furnished by A. A. Archer, assistant engineer. According to him, one man handles the dump, the rock gate and the checks. Dumping has been speeded up to 150 per cent of the rated capacity of the dump.

As indicated in the accompanying photograph, the dump is of the cross-over type, and the mine car is of end-gate composite construction. Under the old dumping arrangement, the car gate was lifted in the dumping operation by a ring suspended by chain, which engaged a hook on the gate. The hook and the ring were engaged automatically when a car ran onto the dump, but it



This Self-Acting Mechanism Cuts One Man From the Dumping Crew

was necessary to release the gate by hand after the car had been emptied of coal.

In the present arrangement the gate is engaged, lifted, lowered, and disengaged automatically. When the car enters the dump, the hinged lever *A* is vertical, being brought into and held in this position by a rope and pulley and a counterweight *B*. Thus it is in line with and engages the gate-hook, *C*, on the mine car. After the car is dumped, this lifter is disengaged from the gate-hook on the mine car by a rope which passes around pulley *D*, and extends to the lever mechanism made up of *E*, *F* and *G*.

The car directly behind the one in the dump actuates this lever mechanism which elevates the gate lifter *A*. When the first car in the trip approaching the dump arrives abreast of the vertical pipe *E*, it engages the lever *F* which turns this pipe, swings the lever *G* and pulls the rope attached to the gate lifter *A*. After the first car in the trip approaching the dump passes the lever *F*, the lifter *A* is free to return to a vertical position by the force exerted through the lowering of the counterweight.

Redesigned Die on Bit-Sharpening Machine Adds Efficiency to Cutting

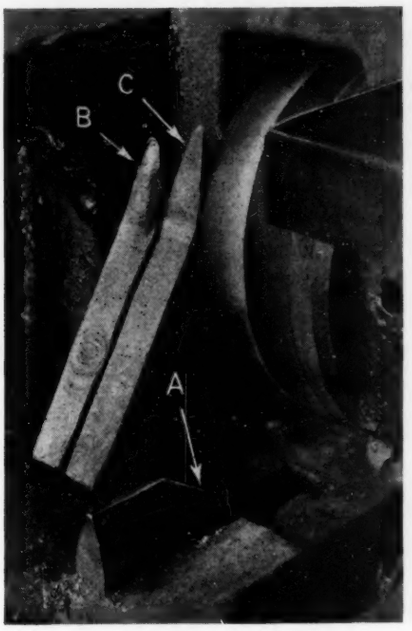
A FOCUS of trouble in the cutting of coal by machines lies in the cutter bits. In hard cutting some of the bits in a chain may be broken somewhere near the tip of the cutting nose before they have been dulled. When that happens, of course, a heavier cutting load is automatically placed on the undamaged bits, and the effectiveness of the machine is disturbed.

If more metal could be added to the nose of the tip without affecting the efficiency of its cutting edge, the trouble referred to would be largely overcome. This improvement has been made by John Fritz, blacksmith, of the Wildwood mine of the Butler Consolidated Coal Co., Wildwood, Pa., where bits are forged in a Sullivan bit-sharpening machine.

In the sharpening process in this machine the heated bit is held against a stationary flat-surface die by a locking jaw and is drawn sharp by a roll die rotating over the heated metal. The stationary die is indicated by *A* in the photograph. As provided by the manufacturer, the surface of this die making contact with the bit is flat. Consequently the upper surface of the bit nose is flat, as indicated on the bit by *C*.

Mr. Fritz conceived the idea of grinding a hollow in the surface of the stationary die *A* as a means of rounding the upper surface of the bit nose. This altered die turns out bits of a shape indicated by *B*. This hollow in the fixed die not only adds more metal to the nose of the bit but it serves to keep the latter centered between the dies during drawing. It also leaves a more pronounced fin along the cutting edge, which, it is said, adds to the cutting capacity of a bit for a single sharpening.

Officials at Wildwood are enthusiastic over the results from this change in design. They say that cutting capacities per bit per sharpening has been increased from 25 to 35 per cent; that the bits last longer and that broken points are a rarity. The all-around savings, they add, are appreciable.

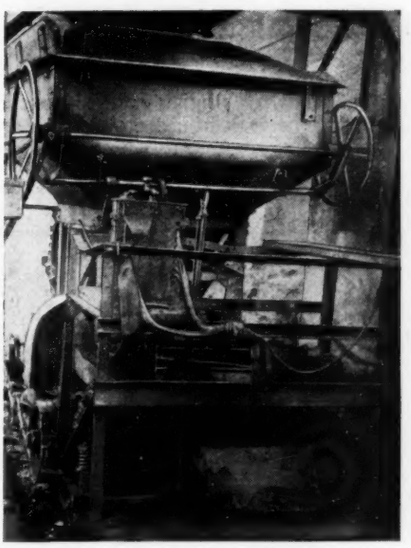


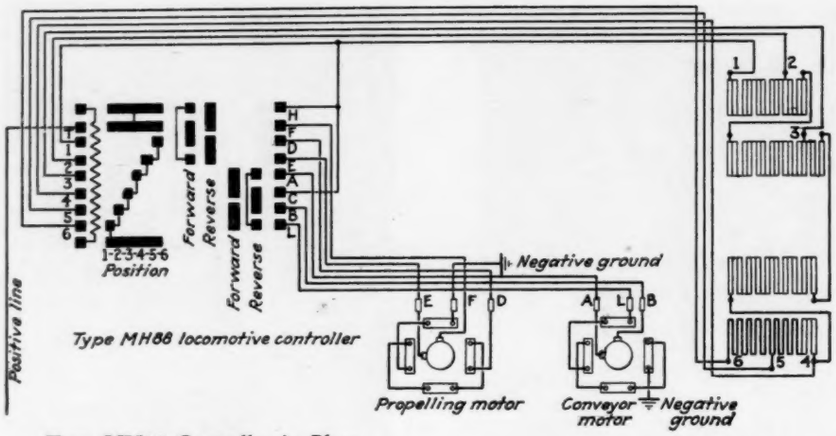
Die Adds More Metal to Bit Points

One Controller Serves In Place of Two

When two or more motors of about the same size are installed close together or on the same machine and do not have to be started simultaneously, one control equipment can be used for both. T. W. Blake, chief electrician of the Nellis (W. Va.) mine of the American Rolling Mills Co., has used this scheme

Operating Two Motors Separately From One Controller





Type MH88 Controller in Place on the Larry

to advantage in rebuilding a self-propelling larry which is equipped with a conveyor to throw the refuse onto the pile.

The conveyor and propelling motors, both of the series d.c. type, are of the same horsepower rating. Each was formerly equipped with a controller and bank of resistance, and the parts of these units were not interchangeable with those of other control equipments at the mine. The two controllers and resistances were replaced by one controller and one resistor.

The controller is interchangeable with those used on the type MH88 mine locomotives. Switching the controller and resistor to either motor is accomplished by manipulating the reverse handle. By this standardization the regular stock of locomotive controller repair parts suffices also for the larry.

Safety Lights at Switch Avert Accidents

Safety lights actuated by throwing the lever prevents accidents at switches, according to H. T. Walton, Wolfpit, Ky. The plan of wiring is shown in the accompanying sketch.

Different color lights are hung so that they can be seen in either direction and serve to show where the motor is. Contact is made by the switch lever resting on copper washers as shown. In this way, the motor crew is warned if the switch is against them and danger of running through is eliminated.

Hoisting Peaks Reduced; Power Cost Cut

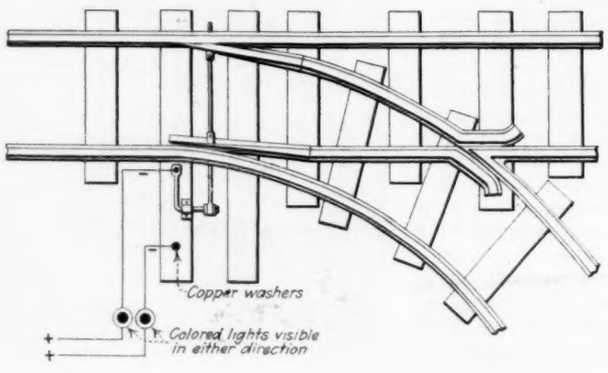
At the Thermal No. 40 mine of the Cosgrove-Meehan Gas Coal Co., Rachel, W. Va., an ordinary ammeter installed in front of the man-hoist operator has resulted in reducing the billing demand by 100 kva., with a saving in power cost of $125 per month. The billing demand at Thermal mine is based on the momentary peak and the coal company is charged on the basis of one-half the highest peak registered in a month. As the coal is reached by shafts, the operation of man-hoist irrespective of the coal hoist at times considerably increased the billing demand.

Interlocks were first considered as a means of preventing the operation of the man hoist at times when the coal hoist was running, but the idea was abandoned because it was necessary to use the former for supplies at times when coal was being brought to the surface. A system of signal lights was installed but this was found to be unsatisfactory because of the time lost in signaling, which adversely affected the raising of coal.

In search of a convenient means of controlling the operation of the man hoist without slowing up the coal hoist, E. L. Fletcher, superintendent, hit upon the installation of an ammeter in front of the man-hoist operator. By keeping his eye on this, the operator is able to control the movement of his cage irrespective of that of the coal hoist, and without adding to the peak. This, however, does not mean that he may proceed only in the intervals between coal hoists. He may start his machine at any time during the hoist when the starting demand, as shown on the ammeter, falls to the normal running demand.

This method of synchronizing the starting of equipment with heavy current demands has been extended to the surface operations. The operator in charge of an aerial tramway recently installed to dispose of tipple waste is stationed so that he can see the coal hoist and is instructed not to start up until the cage has disappeared below the surface. Similar rules have been made for putting tipple machinery in operation and for starting up a large pump on the shaft bottom.

Thermal No. 40 mine produces from 1,500 to 2,000 tons of coal per day and before the installation of the ammeter and the promulgation of rules for operating other machinery, peaks of as high as 1,600 kva. were registered. According to the rate schedule, the coal company would then be paying on the basis of a billing demand of 800 kva. At present, the metered peak is always below 1,200 kva., meaning a billing demand of less than 600 kva. Mr. Fletcher, in addition, is contemplating placing another ammeter in his office as a means of checking the operation of the hoists and also to furnish a record of the number of coal hoists.



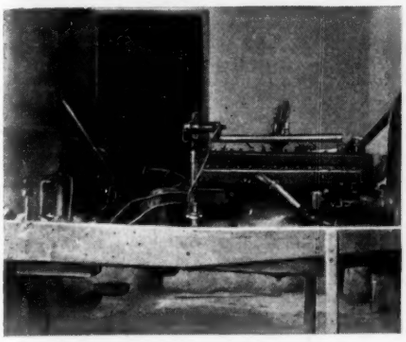
Wiring Diagram, Switch Lights

Automobile Engine Serves As Fan Auxiliary

At Mine No. 2 of the Boone County Coal Corporation, Sharples, W. Va., an eight-cylinder automobile engine is utilized as a standby power source for a mine fan. This engine became available at low cost when a new automobile burned without material damage to the engine itself.

It was left in the automobile frame but the rear end of the latter was cut away. In place of the drive shaft there was added just back of the transmission a shaft and pulley supported by extra bearings. The unit was placed on a foundation in an annex to the fan house and with the drive pulley opposite a door through which the belt can operate to drive the fan.

The fan is a 4- x 5-ft. multi-blade normally driven by a 20-hp. motor which operates on purchased power. The fan pulley is 52 in. in diameter and that on the engine is 8 in. To shift



Auxiliary Drive for Small Fan

from motor drive to engine drive, it is necessary to slip the motor belt off the fan pulley and put on the engine belt. Although the engine radiator is close to the wall it is directly opposite a window which can be opened to admit fresh air for cooling.

Unusual Methods Make A Bad Roof Safe

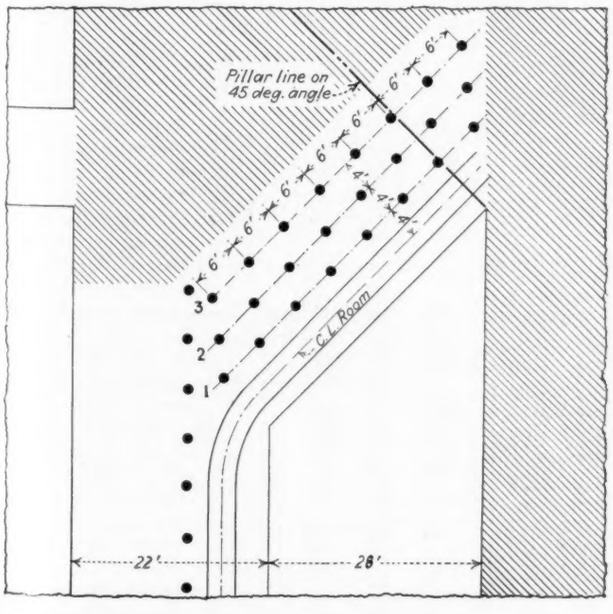
If the material forming the bottom directly under a coal seam is too soft to support the timbers used in mining, the latter will punch through this bottom and finally come to rest only on encountering some hard underlying stratum. Also, the bottom material will work out from the face and rib as rooms and entry places are opened up. The exposed coal, not being adequately supported, will settle and slab out and the roof above it will become badly fractured. This tendency is all the more pronounced in the vicinity of pillar coal.

Such are the conditions encountered in the mining of the 5½-ft. Dorothy seam in the No. 11 mine of the Glogora Coal Co., Stickney, W. Va. The top above the seam is sandstone, and the bottom material is a soft clay, about 8 in. thick, underlaid by sandstone. This combination of conditions makes mining troublesome. The roof is not hard enough to support itself without slabbing over the track, and when it breaks or takes weight without breaking, it forces the timbers through the soft clay to the sandstone. With broken top resting on the posts, not only are the places dangerous but it is impossible to take the pillar coal.

But no longer are these conditions giving trouble in this mine, for they are now being successfully combated by a layout and method of timbering developed by F. J. Hughes, superintendent, the details of which have been provided by Walter Hornsby, mine foreman.

Where a post is to be set, a hole is dug in the bottom to the sandstone, and so the only set of the post is within itself. As indicated in the accompanying sketch, rooms are driven 22 ft. wide on 50-ft. centers and are supported by a single row of timbers set clear of the track. Room pillars are taken open-ended by a 45-deg. cut. This layout provides track space for the accommodation of three cars on a pillar face and permits as many men to work there. Three rows of posts are established and maintained between the gob and the open pillar face. After each cut in the pillar, the track is slued over and a new row of posts is set, after which the last or gob row of timbers is taken out. The removal of timbers is practiced more to get a clean fall than to allow the repeated use of them.

Both room and pillar coal is cut with a top-cutting machine. Cuttings are loaded out and discarded on the rock dump. Before the coal is shot, the place must be inspected by an assistant foreman. Failure to comply with this ruling subjects both the loader and the foreman to dismissal.



Open End Methods Ease Pillar Mining

Reseating Plunger Pump Gaskets

Plunger pumps of cast iron, cement lined, are naturally most susceptible to attack by acid water at the gasket seats. When pumps of this type are taken from the mines of the Berwind-White Coal

No More Leaks on This Pump

Mining Co., Windber, Pa., because of a leaky head, and sent to the central shop for repairs, the gasket seats are counterbored and fitted with a ring of pure lead. These rings are cast and machined to size in the shop.

Motor Does Work of Mule In Handling Slate

For several years a mule was used for pulling a 7-ton side-dump refuse car at Mine No. 4 of the Spruce River Coal Co., Ramage, W. Va. By utilizing a spare 5-hp. motor and spending about $50 for labor and other materials, A. E. Harris, chief electrician, converted the car to a self-propelling electric larry.

Because the dumping ground is a steep hillside, the length of haul is sufficiently short to make it practicable to use low-speed equipment. A motor, controller and gearing could not be placed on the car without alterations, so an overhanging extension was added by bolting supporting pieces to the car sills. The motor is shunt-wound and has the interpoles cut out to simplify the reversing control. Reduction gearing, chain, and sprockets were picked up from the company stock of repair and spare parts.

Yankee Ingenuity Exercised

COAL MARKETS IN 1929

+ Prices Come Back in Last Quarter
Total Production Rises

IN a year devoid of the spectacular, the most notable features of the bituminous market situation were an increase in the total production and a marked strengthening in the price level in the last quarter. U. S. Bureau of Mines estimates place the total 1929 tonnage at 525,358,000, an increase of 24,613,000 tons, or 4.9 per cent, over 1928. The 1929 production is the largest since 1926, when 673,367,000 tons was mined.

This increase, due in large measure to the greater use of fuel by electric utilities, railroads and steel plants, is the more noteworthy in that it was made in the face of increased competition from natural gas and a decline in the reserves in storage. Consumers' stocks of bituminous coal on Jan. 1, 1929, were 41,800,000 net tons, as compared to 55,500,000 net tons on Jan. 1, 1928, and 41,100,000 net tons on Oct. 1 of the same year. On July 1, 1929, stocks had declined to 33,100,000 net tons. The coming of fall, however, brought in its train a movement toward the replenishing of reserves, and the total in the hands of consumers rose to 37,500,000 net tons. The net decline in stocks was 4,300,000 net tons in the first nine months of last year.

Production, on the whole, was undisturbed by labor troubles, and was influenced only by the usual seasonal fluctuations in demand and, in some cases, shifts in tonnage. Buying was largely limited to current requirements, though, as mentioned above, interest in stocking revived in the latter part of the year. Prices moved in a comparatively restricted range, but closed markedly stronger in most of the principal coal markets.

Spot prices for the country as a whole dropped to an average of $1.755 during the first six months of 1929, the lowest figure since 1916. In the third quarter they rose to $1.77, and in the fourth to $1.88, the highest figure of any quarter in the two-year period, 1928-29. This average marks the first definite upturn in a progressive decline extending from 1923, with the exception of a slight increase in 1926. Despite the greater realization in the last half of 1929, however, it was not sufficient to increase the weighted average over that of 1928. The figure for last year was $1.79, as compared to $1.80 for 1928, or an average loss of 1c. per ton.

Movement to the lakes continued to be one of the steadiest and most dependable factors in the trade last year. Shipments of cargo coal for the season ended Dec. 31 were 37,933,249 net tons, as compared to 33,402,121 tons in 1928 and 32,851,000 tons in 1927. In exceeding the 1928 figure, movement to the lakes established a new record. Total dumpings for the season ended Dec. 31, including both cargo and fuel coal, were 39,383,842 net tons.

The decline in the export trade which set in in 1926 was checked last year. During the eleven months ended Nov. 30, exports of bituminous coal were 13,477,877 gross tons, as compared to 13,338,891 gross tons in 1928. Canada took the greater share of the increase, with Italy second. Exports to Cuba, the second largest importer of American coal, decreased slightly as compared to the previous year. Anthracite, though failing to gain to a marked degree, increased its share in the export business to 2,728,313 gross tons in the first eleven months of 1929, as compared to 2,720,177 gross tons for the corresponding period in 1928. Canada, as usual, was the biggest customer.

The calendar year 1929 marked the first definite check in the progressive decline in anthracite production since 1926, the year following the general strike. Estimates by the U. S. Bureau of Mines place the total at 76,640,000 net tons, as compared to 75,348,000 net tons in 1928.

Weather played an important part in the anthracite shipments during the year, relatively moderate temperatures in the first three months and in November causing sharp declines in those periods. Another demoralizing factor was the hand-to-mouth buying attitude adopted by the householder. Shipments to New England and Canada failed to show much increase over the preceding year, while there was a distinct falling off in the movement to the Northwest.

Average Spot Prices of Bituminous Coal, F.o.b. Mines

(Unit, net ton of 2,000 lb.)

Month	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January....	$1.53	$4.15	$2.48	$2.57	$2.57	$3.26	$2.25	$4.38	$2.21	$2.10	$2.18	$2.34	$1.85	$1.85
February...	1.40	4.18	2.53	2.49	2.58	2.77	2.20	3.59	2.25	2.04	2.09	2.11	1.86	1.86
March.....	1.27	3.89	2.58	2.47	2.58	2.63	2.12	3.20	2.15	1.99	2.01	2.06	1.91	1.78
April.....	1.24	3.21	2.64	2.43	3.85	2.62	2.24	2.84	2.07	1.95	1.92	1.93	1.74	1.69
May.....	1.21	4.14	2.67	2.38	4.59	2.68	3.11	2.68	2.04	1.97	1.93	1.87	1.73	1.68
June.....	1.26	4.00	2.57	2.40	7.18	2.52	3.32	2.56	2.03	1.95	1.90	1.85	1.73	1.67
July.....	1.22	3.17	2.58	2.47	8.24	2.40	4.67	2.40	1.98	1.93	1.91	1.87	1.71	1.70
August....	1.30	3.24	2.58	2.76	9.51	2.42	6.13	2.39	1.99	2.04	2.00	2.06	1.74	1.77
September..	1.57	2.02	2.58	2.91	8.52	2.37	5.08	2.46	2.02	2.18	2.15	2.07	1.81	1.83
October....	2.26	2.02	2.58	3.09	7.78	2.33	4.48	2.28	2.10	2.13	2.70	1.96	1.83	1.90
November..	3.87	2.48	2.58	2.57	5.87	2.35	4.11	2.25	2.06	2.26	3.19	1.90	1.85	1.88
December..	4.01	2.48	2.58	2.58	4.38	2.26	4.05	2.18	2.06	2.19	2.53	1.90	1.85	1.87
1st Quarter.	$1.40	$4.07	$2.53	$2.51	$2.58	$2.89	$2.19	$3.72	$2.20	$2.04	$2.09	$2.17	$1.87	$1.83
2d Quarter.	1.24	3.78	2.63	2.40	5.20	2.61	2.64	2.69	2.04	1.96	1.92	1.88	1.73	1.68
3d Quarter.	1.36	2.81	2.58	2.71	8.76	2.40	5.46	2.42	2.00	2.05	2.02	2.00	1.75	1.77
4th Quarter	3.38	2.33	2.58	2.74	6.01	2.31	4.21	2.23	2.07	2.19	2.81	1.92	1.84	1.88
Yearly aver.	$1.85	$3.25	$2.58	$2.59	$5.64	$2.55	$3.67	$2.77	$2.08	$2.06	$2.21	$1.99	$1.80	$1.79

Relative Prices of Bituminous Coal

(Spot prices July, 1913-June, 1914, as base)

Month	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January....	126	343	205	213	212	270	186	362	183	173	180	190	152	153
February...	116	346	209	206	213	229	182	297	186	168	172	174	152	154
March.....	105	321	214	204	213	217	175	264	178	165	166	170	158	147
April.....	103	265	218	200	318	217	185	235	171	161	159	159	144	140
May.....	100	342	221	197	379	222	257	221	169	162	159	155	143	139
June.....	104	331	212	198	593	208	274	212	167	161	157	153	143	138
July.....	101	262	213	204	681	198	386	198	163	160	158	154	141	140
August....	107	268	213	228	786	200	507	198	164	166	165	170	144	146
September..	130	167	213	241	704	196	461	203	167	179	178	171	150	151
October....	187	167	213	256	643	193	370	188	174	176	223	162	152	157
November..	320	205	213	212	485	194	340	186	170	187	264	157	153	156
December..	332	205	213	213	362	187	335	180	170	181	209	157	151	154
1st Quarter.	116	337	209	208	213	239	181	307	182	169	173	178	153	151
2d Quarter.	102	313	217	198	430	216	218	222	169	162	158	156	143	139
3d Quarter.	113	232	213	224	723	198	451	200	165	168	167	165	145	146
4th Quarter	280	192	213	227	497	191	438	184	171	181	232	159	152	155
Yearly aver...	152	269	213	214	466	211	303	226	172	170	182	164	149	148

Hand-to-mouth buying was the principal feature of the Chicago market in 1929. Aside from a "red" uprising in Illinois in December, there was no labor trouble of consequence during the year. Mechanization increased sharply in Illinois and Indiana, cutting the cost of mining somewhat, though not adding materially to the production. Both Illinois and Indiana recaptured a large part of the business which fell to the Eastern high-volatile shippers during the wrangle over the Jacksonville scale.

Western Kentucky participation in the Chicago market was considerably reduced, largely because of price concessions on the part of Illinois and Indiana producers. The latter are confident that they can obtain a still larger portion of the Chicago business in 1930. Anthracite shipments failed to show much change from the unsatisfactory status prevailing in 1928.

Domestic sizes, both smokeless and high-volatile, were active for an unusually long period in the spring, owing to the protracted cold weather. As a result, steam sizes, particularly screenings, never really recovered from the slump throughout the whole of the year.

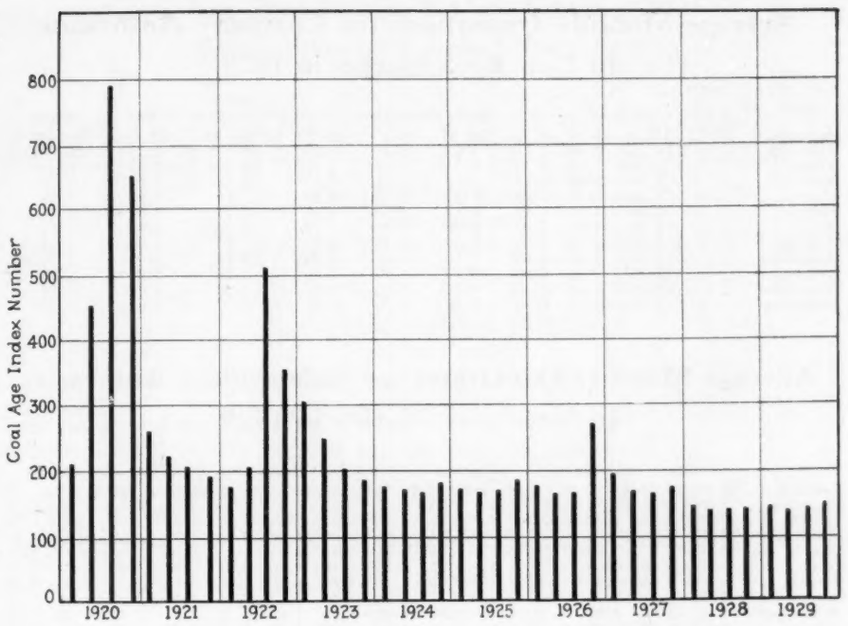
After a stagnant period in the middle of the summer, domestic coals were actively in demand at the last of the year under the spur of a severe cold snap. Smokeless coals especially enjoyed a good, though not exceptional, year.

After a good start at the first of the year, in response to the prevailing cold weather, domestic demand in the St. Louis area flagged materially in April. Up until the last of the year, with the exception of September, business was very poor. In the last two months, however, the return of cold weather brought domestic sales back with a rush and considerably increased prices over preceding months. Steam sizes, on the contrary, were almost uniformly slow throughout the year, slumping badly at the close. The advent of natural gas in the St. Louis area is expected to exert an even more unfavorable influence on this business in the future.

Dock operators at the Head of the Lakes experienced one of the best years in history in 1929. While the spring months were quiet, the booking of big seasonal contracts and liberal spot orders resulted in a heavy movement the rest of the year. All classes of bituminous coal were in good demand, with West Virginia smokeless finding especial favor. Anthracite experienced an unsatisfactory year, however, as a considerable tonnage was replaced by smokeless coals, coke and briquets.

Southwestern production increased about a million tons in 1929, despite unsatisfactory quotations in the Kansas City market. Kansas deep-shaft lump started at $4.25 in January, but sold during the greater part of the year at $3.75, rising to $4 late in December. Shovel nut and lump closed at $3, as compared to the year's top of $3.25, while prices on screenings and crushed mine-run slid from $1.75 to $1.25@ $1.50. Arkansas semi-anthracite found an unusually broad outlet and the price range was accordingly smaller, though the top price of $5 of the year 1928 was not exceeded. Paris lump, on the average, was 50c. lower throughout the year.

Cold weather resulted in a good domestic demand in Colorado at the beginning of 1929, which was terminated by a temperature rise in April. Steam sizes dragged until May, when the



Relative Spot Prices of Bituminous Coal

In constructing the *Coal Age* Index number of spot prices on bituminous coal the average for the year ended June, 1914, on thirteen coals representative of a large part of the annual output of the United States is taken as 100. Prices on these coals are weighted first with respect to the proportions of slack, mine-run and prepared sizes shipped and second with respect to the tonnage each district produced.

Bituminous Coal Output, Spot Prices and Index, by Weeks, 1929

Week Ended	Production (Net Tons)	Average Spot Price	Coal Age Index
January 5	9,854,000	$1.84	152
January 12	11,670,000	1.85	153
January 19	11,686,000	1.85	153
January 26	11,771,000	1.84	152
February 2	11,675,000	1.85	153
February 9	12,070,000	1.87	154
February 16	11,941,000	1.87	154
February 23	11,752,000	1.86	154
March 2	11,154,000	1.85	153
March 9	10,260,000	1.84	152
March 16	9,586,000	1.82	151
March 23	8,409,000	1.75	144
March 30	7,944,000	1.70	140
April 6	7,641,000	1.71	141
April 13	8,247,000	1.69	140
April 20	8,651,000	1.69	140
April 27	9,118,000	1.68	139
May 4	8,781,000	1.68	139
May 11	9,142,000	1.67	138
May 18	8,939,000	1.67	138
May 25	9,164,000	1.68	139
June 1	8,435,000	1.68	139
June 8	9,156,000	1.66	137
June 15	9,307,000	1.68	139
June 22	9,078,000	1.65	136
June 29	9,474,000	1.68	139
July 6	7,414,000	1.70	140
July 13	9,432,000	1.69	140
July 20	9,202,000	1.69	140
July 27	9,480,000	1.70	140
August 3	9,226,000	1.77	146
August 10	9,570,000	1.76	145
August 17	9,550,000	1.77	146
August 24	9,971,000	1.78	147
August 31	10,689,000	1.79	148
September 7	9,338,000	1.78	147
September 14	10,863,000	1.84	152
September 21	10,867,000	1.83	151
September 28	11,453,000	1.87	154
October 5	11,110,000	1.89	156
October 12	11,574,000	1.90	157
October 19	11,150,000	1.94	160
October 26	11,415,000	1.91	158
November 2	11,064,000	1.88	156
November 9	11,081,000	1.87	155
November 16	10,547,000	1.85	154
November 23	10,972,000	1.86	153
November 30	9,993,000	1.88	155
December 7	11,727,000	1.88	155
December 14	11,593,000	1.87	154
December 21	11,156,000	1.87	154
December 28	7,675,000	1.87	154

Coal and Coke Receipts at Duluth-Superior Docks in 1929 by Months*

(In Net Tons)

	Soft	Hard	Coke	Total
April	764,149	57,203	9,500	830,852
May	1,658,251	132,788	31,315	1,822,354
June	1,713,661	52,564	15,656	1,781,881
July	1,533,303	55,477	3,819	1,592,599
August	1,502,082	63,160	2,500	1,567,742
Sept.	1,208,941	30,162	.....	1,239,553
Oct.	968,754	4,566	2,100	975,420
Nov.	857,763	4,879	5,849	868,491
Dec.	123,541	.....	4,543	128,084
Totals	10,330,445	401,249	75,282	10,806,976

*U. S. Harbor Engineer's Office, Duluth, Minn.

Coal and Coke Receipts in Last Eight Years at Upper Lake Docks

(In Net Tons)

	Soft	Hard	Coke*	Total
1922	5,138,934	566,362	.....	5,705,296
1923	11,268,337	1,419,984	.....	12,688,321
1924	7,730,878	1,289,994	.....	9,020,872
1925	8,882,569	790,132	.....	9,672,701
1926	9,168,656	1,272,973	.....	10,441,629
1927	11,452,444	981,194	.....	12,433,638
1928	9,688,342	652,095	.....	10,340,437
1929	10,330,445	401,249	75,282	10,806,976

Average total received during the past eight years 10,138,734.

*Coke included in soft coal prior to 1929.

Coal Shipments in 1929 From Docks At Head of the Lakes*

	1929 Cars	1928 Cars	1927 Cars	1926 Cars
January	32,754	27,250	27,547	23,990
February	31,290	22,804	21,091	19,219
March	15,562	18,518	14,646	14,836
April	12,827	14,135	13,218	11,855
May	18,100	14,717	15,117	11,808
June	14,036	12,279	14,495	12,659
July	13,588	12,585	13,267	16,223
August	19,294	19,332	23,703	18,306
September	22,252	25,003	25,794	27,590
October	26,067	29,928	32,178	30,993
November	29,428	27,492	30,109	35,531
December	30,000	27,072	35,909	32,687
Totals	265,198	251,054	267,074	258,697

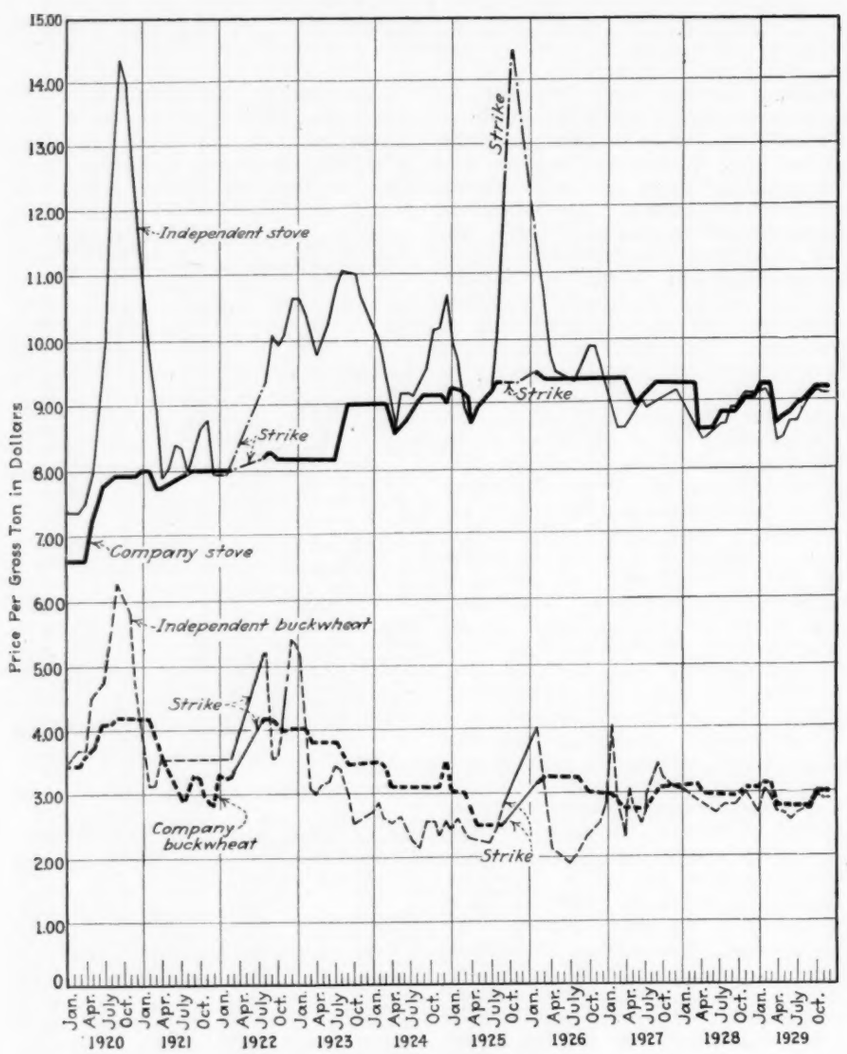
*Western Weighing & Inspection Bureau.

Average Monthly Quotations for Company Anthracite In New York Market in 1929

	Broken	Egg	Stove	Chestnut	Pea	No. 1 Buckwheat	Rice	Barley
January	$8.25—$8.50	$8.75	$9.25	$8.75	$5.00	$3.00—$3.75	$2.25	$1.70—$1.75
February	8.25— 8.50	8.75	9.25	8.75	5.00	3.00— 3.25	2.25	1.70— 1.75
March	8.25— 8.50	8.75	9.25	8.75	5.00	3.00— 3.25	2.25	1.70— 1.75
April	7.90— 8.00	8.15	8.65	8.15	4.40	2.75	2.00	1.50
May	8.00— 8.10	8.25	8.75	8.25	4.50	2.75	2.00	1.50
June	8.00— 8.10	8.30	8.80	8.30	4.60	2.75	2.00	1.50
July	8.00— 8.20	8.40	8.90	8.40	4.70	2.75	2.00	1.50
August	8.00— 8.30	8.50	9.00	8.50	4.80	2.75	2.00	1.50
September	8.00— 8.40	8.60	9.10	8.60	4.90	2.75	2.00	1.50
October	8.20— 8.50	8.70	9.20	8.70	5.00	2.75	2.00	1.50
November	8.20— 8.50	8.70	9.20	8.70	5.00	3.00	2.00	1.50
December	8.20— 8.50	8.70	9.20	8.70	5.00	3.00	2.00	1.50

Average Monthly Quotations for Independent Anthracite In New York Market in 1929

	Egg	Stove	Chestnut	Pea	No. 1 Buckwheat	Rice	Barley
January	$8.50–$8.75	$9.10–$9.25	$8.55–$8.75	$4.50–$5.00	$2.65–$3.25	$1.50–$2.00	$1.00–$1.70
February	8.50– 8.75	8.85– 9.25	8.50– 8.75	4.40– 5.00	2.60– 3.25	2.25– 2.50	1.00– 1.70
March	7.90– 8.75	8.40– 9.25	7.90– 8.75	4.25– 5.00	2.50– 3.25	1.35– 2.00	1.35– 1.70
April	7.90– 8.15	8.25– 8.65	7.90– 8.15	4.05– 4.40	2.50– 2.75	1.75– 2.00	1.35– 1.50
May	8.00– 8.25	8.60– 8.80	8.05– 8.30	4.25– 4.60	2.35– 2.75	1.75– 2.00	1.35– 1.50
June	8.05– 8.30	8.60– 8.80	8.05– 8.30	4.30– 4.60	2.30– 2.75	1.60– 2.00	1.25– 1.50
July	8.15– 8.50	8.65– 9.00	8.15– 8.50	4.25– 4.80	2.50– 2.75	1.65– 2.25	1.40– 1.50
August	8.25– 8.50	8.75– 9.00	8.25– 8.50	4.30– 4.80	2.65– 2.75	1.85– 2.00	1.40– 1.50
September	8.40– 8.60	8.90– 9.10	8.40– 8.60	4.60– 4.90	2.65– 2.75	1.85– 2.00	1.40– 1.50
October	8.60– 8.70	9.10– 9.20	8.60– 8.70	4.50– 5.00	2.75– 3.00	1.75– 2.00	1.35– 1.50
November	8.45– 8.70	9.00– 9.20	8.60– 8.70	4.65– 5.00	2.75– 3.00	1.75– 2.00	1.35– 1.50
December	8.55– 8.70	9.00– 9.20	8.65– 8.70	4.75– 5.00	2.70– 3.00	1.70– 2.00	1.40– 1.50



Anthracite Prices for Ten Years

This diagram shows in dollars per gross ton the average company circular price and average spot quotations on "independent' stove and No. 1 buckwheat, f.o.b. mine basis, as quoted on the New York market.

slackening in production caused a marked strengthening. Domestic sizes came back in September, and both classes were in good demand until the end of the year. Natural gas was an adverse factor in the market, and is expected to materially affect the production in the future.

Utah coal output in 1929 exceeded that of 1928 in spite of increased competition from natural gas. The adoption of a fair trade practice code by the Utah producers brought results in the form of a stronger price trend at the end of the year.

The past year again proved disappointing to the Kentucky trade. Changes in the freight rate structure materially reduced tonnage formerly shipped to the Chicago territory and the lakes. Average prices, however, were maintained at their 1928 level in eastern Kentucky and slipped only slightly in the western part, where operators were almost forced to give screenings away during the last part of the year. Domestic sizes held firmly throughout, with a slight increase in western Kentucky at the last. Steam coal, on the other hand, was draggy almost the entire period and operators were forced to mark up the larger sizes in the last three months to come out even.

Cincinnati experienced an evenly balanced year in 1929, with seasonal changes in tonnage and prices coming in regular order. The peak of the year occurred in late September, in response to lower temperatures, after which the trade settled back to the winter grind. The only flurry of the year occurred in smokeless mine-run in September, when it sold at $4, as compared to $3@$3.75 for lump and egg. Smokeless slack in August dropped to 50c., as compared to $1.50@$1.60 in December, the high of the year.

Among the outstanding developments of the year was the maintenance of the lake movement in eastern Kentucky and southern West Virginia in spite of increased rate differentials; curtailment of production by Kentucky operators when necessary to avoid glutting the market, often nullified by corresponding increases in southern West Virginia output and the maintenance of circular prices by smokeless producers in the face of stalled markets and price-cutting on the part of others. In a retail way, Cincinnati had a good year, with a slackening in oil and gas competition noticeable.

Considerable improvement over 1928 was registered in the Columbus market last year, aided considerably by a policy of curtailed production in slack times. Domestic demand, good during the first part of the year, slumped in the summer, because of reluctance on the part of industrial consumers and dealers to lay in stocks, but regained its position and registered a price advance of 25c.@50c. in the period following September. Steam business looked up after Oct. 1, after being in the doldrums during the preceding months. The lake trade was good and for the first time in several years Ohio-mined coal went to the

Northwest, helping to maintain Ohio markets.

Almost uniform prices on western Pennsylvania production prevailed in the Pittsburgh market last year. The same condition also characterized the year 1928, but in 1929 the range of quotations was much narrower. Slack was the most active, with steam grades at a high of $1 and a low of 60c., the latter at periods when lump production was unusually heavy.

The year in the central Pennsylvania market was uneventful. After a brief spurt at the beginning, it settled down to an even tenor for the summer. Better business arrived in August, with a slight strengthening in quotations, extending until the end of the year.

In the New England market, the year 1929 as a whole showed promise of better things. Though unrestricted output played havoc with values, especially in October and November, the experience proved so painful that West Virginia operators were functioning on the basis of market requirement at the end of the year.

Navy Standard mine-run hit $4, f.o.b. vessels at Hampton Roads, in April and May, with nut-and-slack 30c. less, but rose to $4@$4.15 at the end of July. The peak was reached in mid-October, with mine-run at $5 and nut-and-slack at $4.45. Increased production put an end to this and a slump in prices occurred around Nov. 15 with the termination of the lake trade. Curtailment of production resulted in a recovery at the end of the year, with mine-run at $4.50@$4.65. All-rail business lagged throughout the year. Prices were at a minimum and the tonnage was probably less than in any recent normal year.

Business at New York was only fair during the first seven months of 1929. Though contracting was good, prices ranged 10c.@15c. lower than the previous year. Spot sales, on the other hand, languished. With the coming of August, movement picked up somewhat and continued fairly good until the end of the year, without, however, much advance in prices.

Bolstered by an excellent industrial situation, movement of coal to the Philadelphia area was brisk throughout the year. Prices, however, were still a source of dissatisfaction, though some betterment was manifested in November. Storage was a problem which vexed the trade throughout the year.

Lack of demand was the outstanding feature of the Birmingham market in the year just past. Production was sharply curtailed to meet market conditions, but keen competition for available business made prices unstable and, in many cases, unprofitable to the producer.

Anthracite was able to hold its own during 1929 in the fight to regain lost ground. Domestic movement in New York and Philadelphia was reasonably good throughout the year, with chestnut the favorite. Steam sizes were actively in demand, with buckwheat in the lead, chiefly because of its increased use in domestic heating.

Coal Age Spot Prices, F.O.B. Mines, for 1929

Southern Illinois (Franklin County) Coals

CHICAGO MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Lump	$2.93	$2.93	$2.91	$2.25	$2.43	$2.55	$2.74	$2.90	$3.15	$3.15	$3.15	$3.15
Mine-run	2.20	2.20	2.19	2.15	2.15	2.15	2.15	2.15	2.15	2.17	2.25	2.15
Screenings	1.48	1.39	1.55	1.70	1.80	1.80	1.62	1.50	1.28	1.35	1.33	1.40
Weighted av.—all sizes	2.43	2.41	2.43	2.12	2.21	2.27	2.34	2.39	2.47	2.50	2.52	2.49

Central Illinois Coals

CHICAGO MARKET

Lump	2.49	2.53	2.53	1.83	2.01	2.13	2.31	2.43	2.53	2.53	2.53	2.53
Mine-run	1.88	1.88	1.88	1.68	1.77	1.77	1.78	1.78	1.78	1.78	1.78	1.78
Screenings	1.09	1.00	1.19	1.45	1.45	1.45	1.15	1.07	1.03	0.82	0.72	1.05
Weighted av.—all sizes	2.03	2.03	2.06	1.71	1.82	1.90	1.92	1.97	2.01	1.97	1.96	2.01

Coals of the Standard District

ST. LOUIS MARKET

Lump	2.10	2.08	2.04	1.75	1.95	1.93	1.92	2.00	2.00	2.03	2.13	2.13
Mine-run	1.80	1.58	1.75	1.68	....	1.70	1.63	1.75	1.65	1.66	1.70	1.70
Screenings	0.55	0.51	0.77	1.30	1.28	1.13	0.99	0.85	0.50	0.43	0.44	0.68
Weighted av.—all sizes	1.69	1.65	1.72	1.65	....	1.72	1.65	1.71	1.61	1.62	1.68	1.72

Coals of the Mt. Olive District

ST. LOUIS MARKET

Lump	2.35	2.35	2.30	1.93	1.96	2.18	2.37	2.43	2.58	2.56	2.50	2.50
Mine-run	2.00	2.00	2.00	1.75	1.76	1.80	2.02	2.10	1.75	1.75	1.75	1.75
Screenings	1.22	1.08	1.50	1.49	1.49	1.45	1.31	1.35	0.60	0.60	0.87	1.04
Weighted av.—all sizes	1.93	1.90	2.00	1.79	1.80	1.90	1.98	2.12	1.95	1.94	1.96	1.99

Indiana Fourth and Fifth Vein Coals

CHICAGO MARKET

Lump	2.53	2.56	2.56	2.20	2.24	2.24	2.19	2.23	2.40	2.58	2.38	2.53
Mine-run	1.71	1.73	1.73	1.63	1.59	1.54	1.54	1.54	1.59	1.65	1.65	1.65
Screenings	1.30	1.17	1.17	1.43	1.43	1.43	1.11	1.05	0.94	0.95	0.96	1.21
Weighted av.—all sizes	1.96	1.95	1.96	1.82	1.83	1.80	1.73	1.71	1.76	1.87	1.80	1.91

Western Kentucky Coals

AVERAGE OF QUOTATIONS ON CHICAGO AND LOUISVILLE MARKETS

Lump	1.97	1.97	1.80	1.44	1.37	1.30	1.32	1.45	1.82	2.12	2.09	2.13
Mine-run	1.16	1.14	1.13	1.14	1.10	1.08	1.10	1.06	1.06	1.01	1.01	1.07
Screenings	0.87	0.73	0.69	1.09	1.02	0.93	0.76	0.56	0.47	0.35	0.42	0.59
Weighted av.—all sizes	1.39	1.36	1.28	1.25	1.18	1.14	1.11	1.12	1.22	1.25	1.27	1.34

Southeastern Kentucky Coals

AVERAGE OF QUOTATIONS ON CINCINNATI, CHICAGO AND LOUISVILLE MARKETS

Lump	2.43	2.66	2.26	1.92	1.91	1.91	2.02	2.25	2.42	2.60	2.51	2.51
Mine-run	1.47	1.48	1.46	1.41	1.43	1.44	1.43	1.40	1.41	1.45	1.43	1.46
Screenings	0.84	0.78	0.78	1.15	1.01	0.96	0.94	0.84	0.77	0.77	0.91	1.00
Weighted av.—all sizes	1.95	2.08	1.84	1.67	1.66	1.65	1.70	1.82	1.92	2.03	2.00	2.01

Hocking District (Ohio) Coals

COLUMBUS MARKET

Lump	1.88	1.89	1.88	1.88	1.87	1.83	1.83	1.84	2.01	2.08	2.07	2.05
Mine-run	1.49	1.47	1.40	1.39	1.39	1.47	1.48	1.51	1.50	1.50	1.50	1.52
Screenings	0.82	0.80	1.02	1.19	1.20	1.18	1.18	1.14	1.02	1.09	0.96	0.95
Weighted av.—all sizes	1.55	1.55	1.55	1.58	1.58	1.57	1.57	1.59	1.65	1.70	1.57	1.66

Pittsburgh District (Western Pennsylvania) Coals

Lump	1.96	1.98	1.96	1.94	1.90	1.95	1.95	1.95	1.95	2.01	2.00	2.00
Mine-run	1.60	1.59	1.58	1.58	1.57	1.58	1.58	1.58	1.58	1.65	1.72	1.68
Screenings	0.97	0.93	1.05	1.06	1.04	1.05	1.05	1.05	1.05	1.07	1.10	1.10
Weighted av.—all sizes	1.56	1.55	1.56	1.57	1.54	1.56	1.56	1.56	1.56	1.62	1.65	1.63

Mine-Run Coal From Cambria, Somerset and Clearfield Districts

BOSTON MARKETS

Clearfield	1.78	1.75	1.74	1.66	1.62	1.63	1.71	1.78	1.74	1.80	1.72	1.62
Cambria	1.82	1.95	1.93	1.91	1.87	1.83	1.90	1.90	1.90	2.02	1.89	1.84
Somerset	1.95	1.85	1.85	1.82	1.74	1.67	1.77	1.85	1.82	1.92	1.79	1.72

Southern West Virginia Smokeless Mine-Run Coal

VARIOUS MARKETS

Columbus	1.83	1.91	1.87	1.86	1.87	1.88	1.88	2.02	2.13	2.21	2.13	2.13
Chicago	2.14	2.05	2.02	2.03	1.93	1.88	1.90	2.10	2.08	2.13	2.07	2.13
Cincinnati	2.18	2.25	2.07	1.88	1.89	1.88	1.94	2.13	2.22	2.23	2.13	2.07
Boston	1.68	1.70	1.65	1.43	1.47	1.48	1.48	1.51	1.64	1.93	1.91	1.89
Average—all markets	1.96	1.98	1.89	1.80	1.79	1.78	1.81	1.93	2.02	2.13	2.06	2.06

Southern West Virginia High-Volatile Coals

AVERAGE OF QUOTATIONS ON COLUMBUS AND CINCINNATI MARKETS

Lump	2.15	2.24	1.98	1.85	1.83	1.83	1.87	1.98	2.20	2.31	2.22	2.29
Mine-run	1.43	1.41	1.37	1.34	1.34	1.35	1.38	1.39	1.40	1.42	1.42	1.42
Screenings	0.83	0.71	0.82	1.12	1.01	0.96	0.91	0.82	0.74	0.81	0.94	0.94
Weighted av.—all sizes	1.52	1.54	1.46	1.44	1.43	1.42	1.44	1.46	1.53	1.57	1.58	1.58

Big Seam (Alabama) Coals

BIRMINGHAM MARKET

Lump	2.40	2.50	1.88	1.75	1.90	2.05	2.15	2.15	2.22	2.13	2.13	2.25
Mine-run	1.38	1.38	1.38	1.38	1.63	1.63	1.63	1.63	1.58	1.38	1.38	1.38
Washed screenings	1.88	1.88	1.84	1.75	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63

Eastern Coals

NEW YORK MARKET

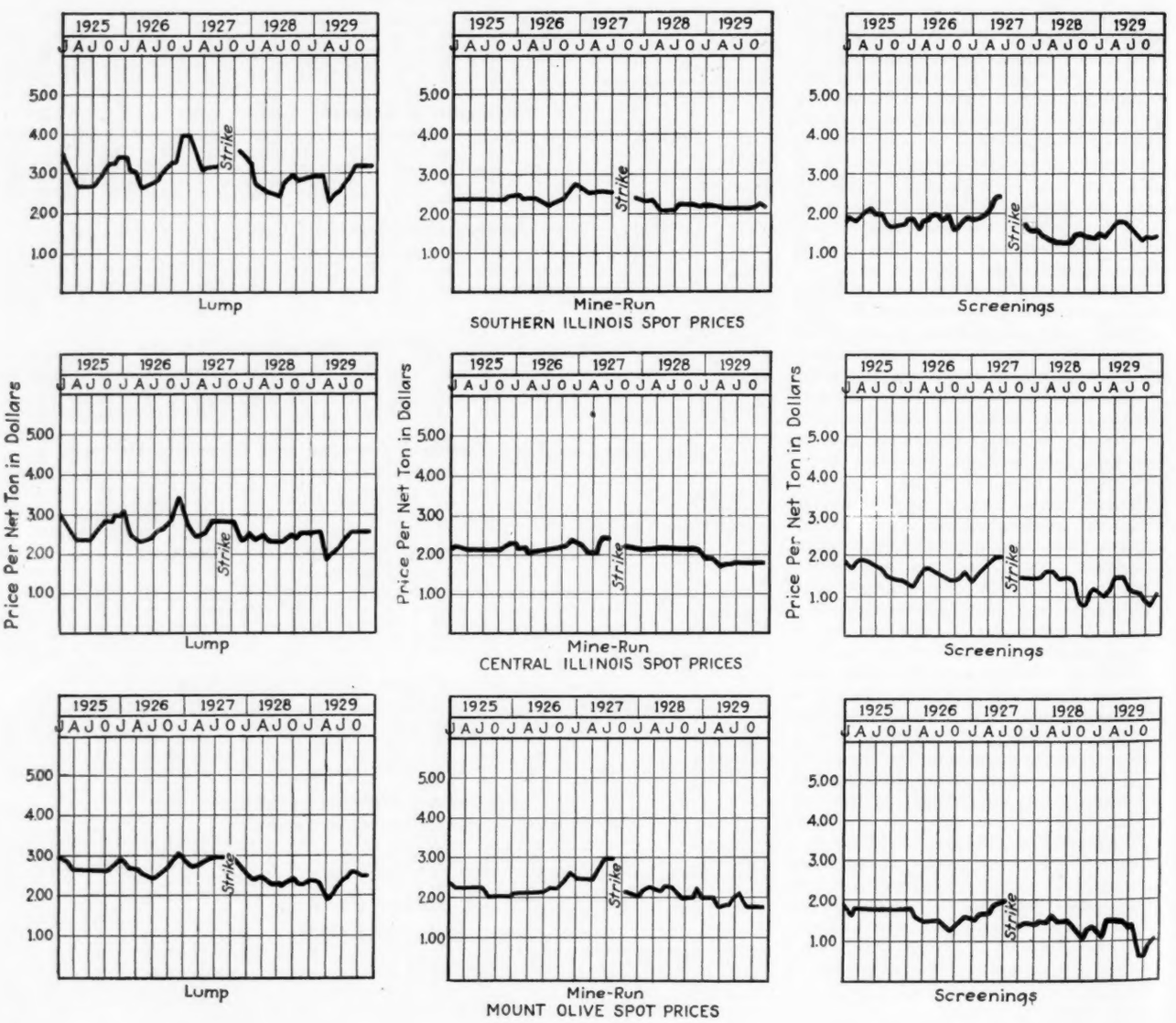
Pool 1 (Navy Standard)	2.45	2.44	2.41	2.38	2.29	2.19	2.16	2.23	2.27	2.33	2.37	2.39
Pool 9 (super low vol.)	1.83	1.88	1.85	1.86	1.79	1.81	1.80	1.80	1.88	1.88	1.97	2.06
Pool 10 (h. gr. low vol.)	1.71	1.73	1.63	1.55	1.63	1.70	1.65	1.63	1.63	1.63	1.75	1.80
Pool 11 (low vol.)	1.48	1.55	1.43	1.45	1.40	1.41	1.38	1.38	1.38	1.43	1.58	1.68
Pool 54-64	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.28	1.32	1.28	1.33

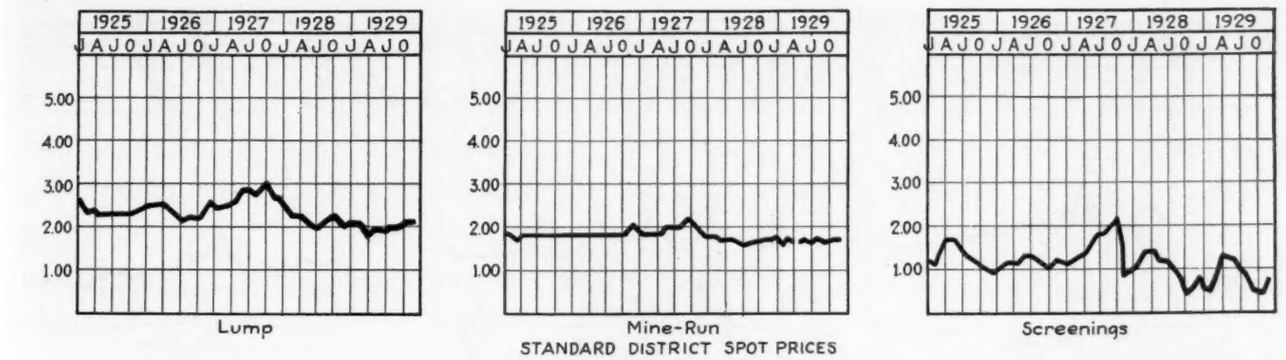
BITUMINOUS

Spot Coal Price Trends

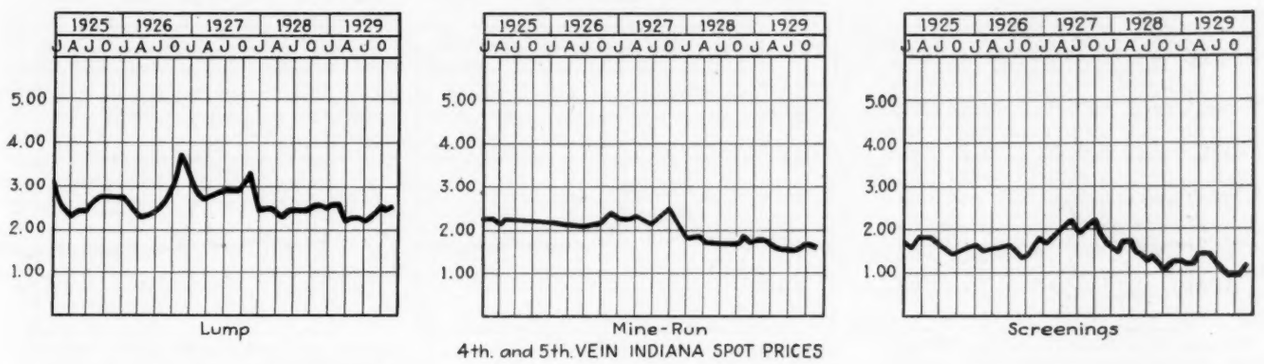
1925 — 1929

Graphs following show the trend of bituminous spot prices in representative producing districts during the last five years and are based upon the market data regularly collected and compiled by *Coal Age*. Average spot prices on these coals, representative of a large part of the annual production of the United States, are given on page 61. These prices are obtained by weighting the average quoted prices on screenings, mine-run and prepared sizes with respect to the proportions of each of these sizes normally shipped.

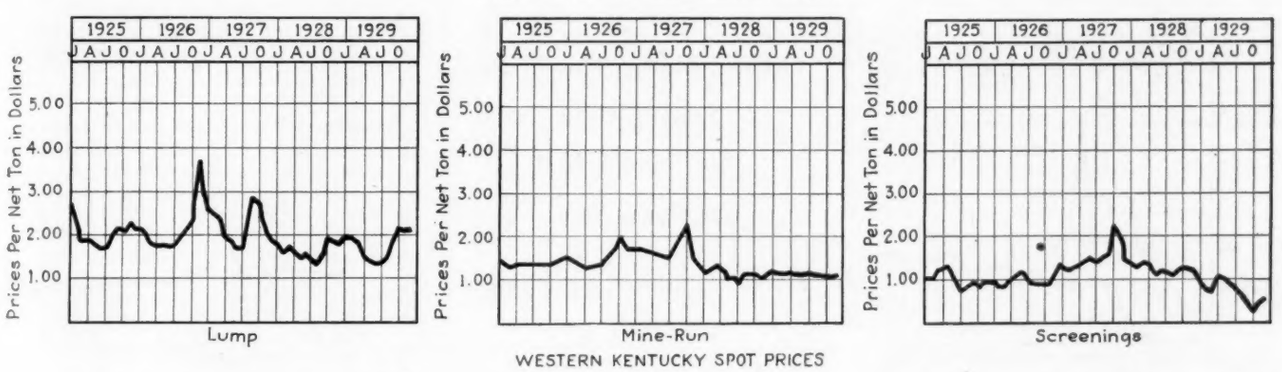




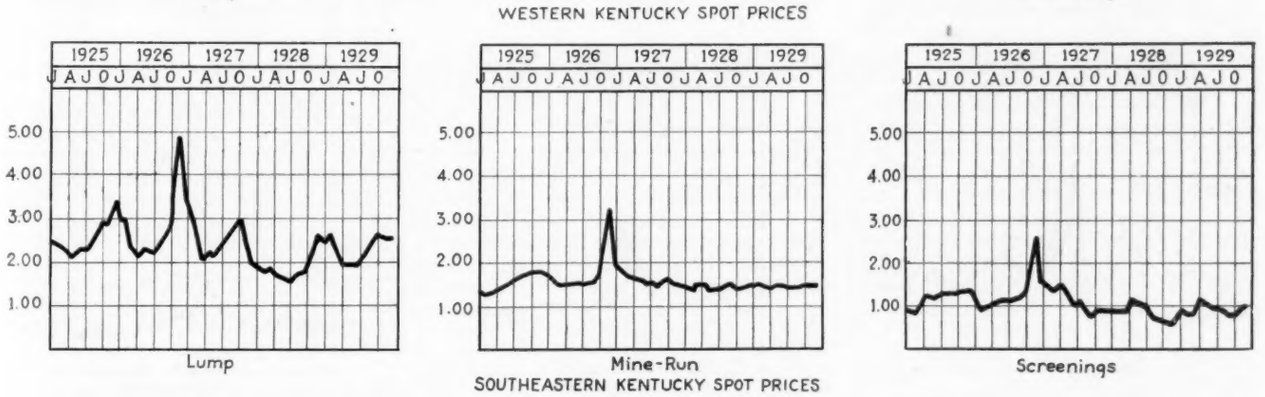
STANDARD DISTRICT SPOT PRICES



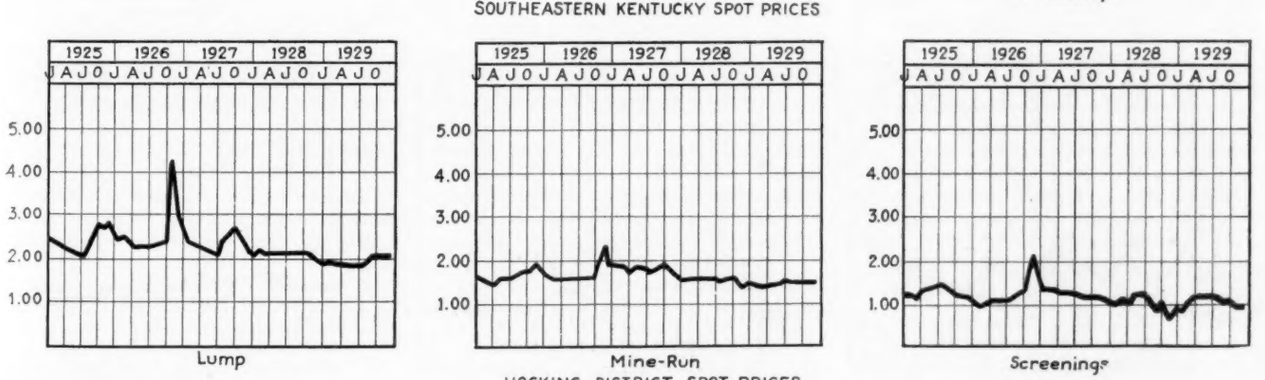
4th. and 5th. VEIN INDIANA SPOT PRICES



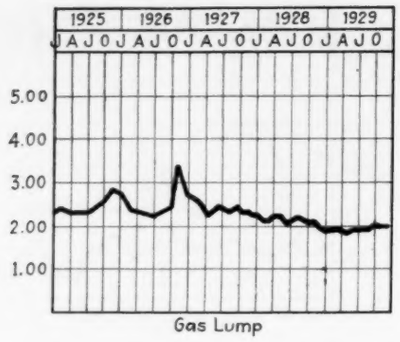
WESTERN KENTUCKY SPOT PRICES



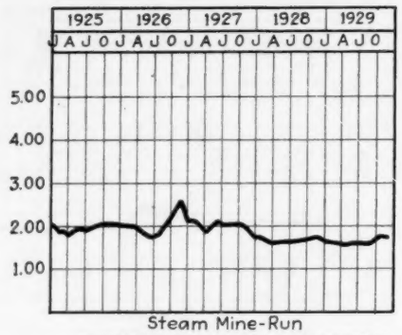
SOUTHEASTERN KENTUCKY SPOT PRICES



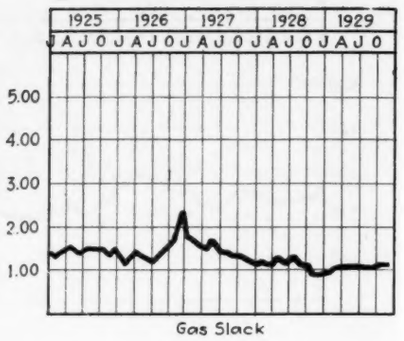
HOCKING DISTRICT SPOT PRICES



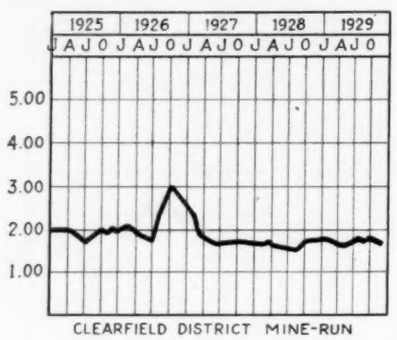
Gas Lump



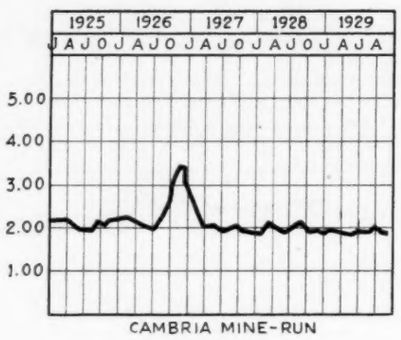
Steam Mine-Run
PITTSBURGH (WEST PA.) SPOT PRICES



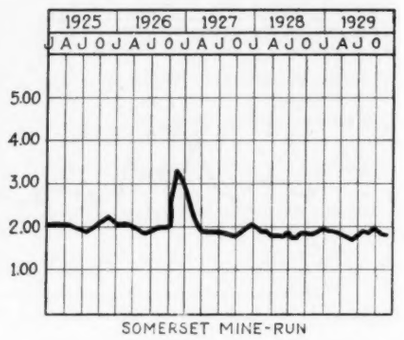
Gas Slack



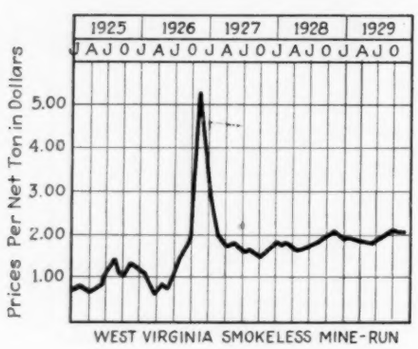
CLEARFIELD DISTRICT MINE-RUN



CAMBRIA MINE-RUN



SOMERSET MINE-RUN



WEST VIRGINIA SMOKELESS MINE-RUN

General Market Conditions

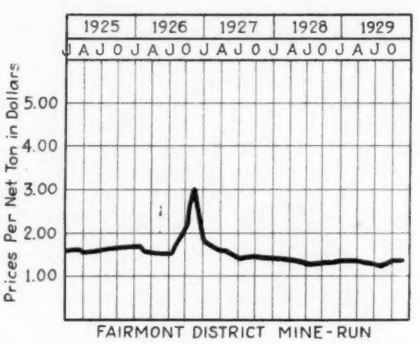
During 1929

Are Summarized

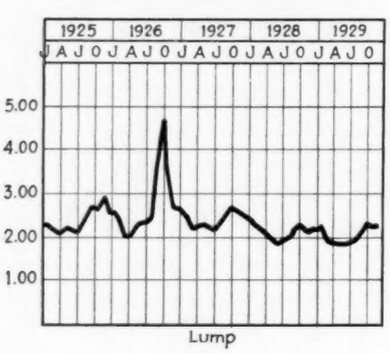
On Pages 58-61

Prices Tabulated by Months

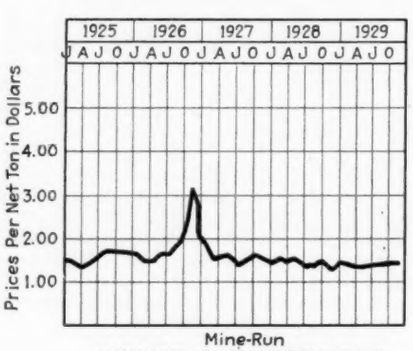
On Page 61



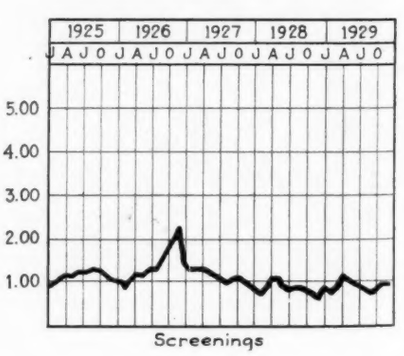
FAIRMONT DISTRICT MINE-RUN



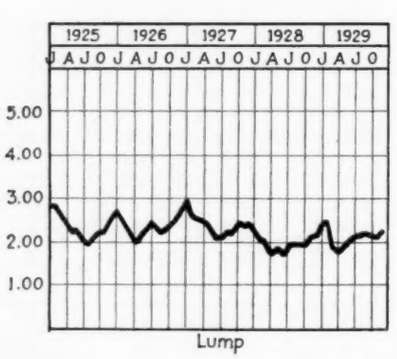
Lump



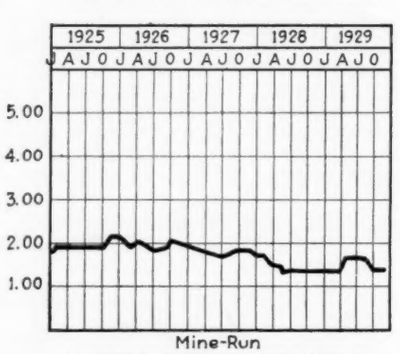
Mine-Run
KANAWHA DISTRICT SPOT PRICES



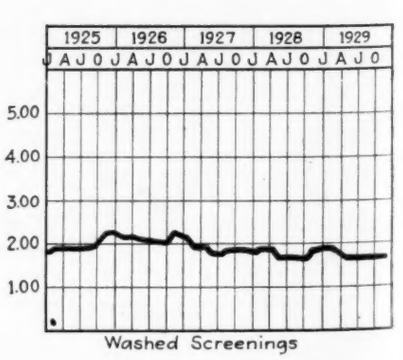
Screenings



Lump



Mine-Run
ALABAMA DISTRICT SPOT PRICES



Washed Screenings

WORD *from the* FIELD

Industrial Coal Reserves Drop To Twenty-Seven Days

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on Dec. 1 were 37,512,000 net tons, according to the monthly report of the National Association of Purchasing Agents, Inc. This figure is approximately 3,000,000 tons, or 9 per cent, lower than on Dec. 1 a year ago.

The association anticipates that stocks will not be built up to any extent more than at present, and that the only production required will be that necessary to meet consumption, with the exception of the lakes, which stocks are not included in the above figures and where coal is already in storage in sufficient quantity to meet the winter requirements. Therefore it is most probable, with anticipated business in the first quarter of 1930 lower than 1929, that coal production during this quarter also will be lower, and all requirements will be met by the mining industry on a normal producing basis.

Days' Supply of Bituminous Coal in Various U. S. Industries

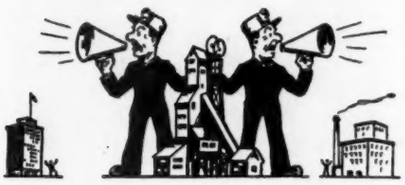
Byproduct coke	29	Railroads	20
Electric utilities	51	Steel mills	27
Coal gas plants	78	Other industries	25
Average total bituminous stocks throughout the United States			27

Estimates of Output, Consumption and Stocks in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
November, 1928	53,498,000	35,879,000	41,520,000
December	49,606,000	37,354,000	41,010,000
January, 1929	58,500,000	35,518,000	41,492,000
February	54,000,000	38,175,000	40,808,000
March	44,391,000	40,566,000	40,108,000
April	43,329,000	37,650,000	35,385,000
May	46,480,000	37,298,000	33,468,000
June	42,969,000	34,485,000	31,282,000
July	45,635,000	34,640,000	31,415,000
August	49,843,000	34,361,000	32,712,000
September	51,307,000	34,943,000	34,289,000
October	59,567,000	39,482,000	34,947,000
November	51,719,000	38,747,000	37,313,000
Dec. 1			37,512,000

West Coast Institute

The annual Institute at the College of Mines of the University of Washington, which is open to all persons interested in any branch of the mineral industry, will be held at Seattle, Wash., the week of Jan. 20. In addition to lectures by the regular staff of the College there will be talks by representative engineers and operators of the Northwest. The extensive new equipment recently installed in the Mines Laboratory will be available for instruction and demonstrations in mining, metallurgy and ceramics.



COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 *Colliery Engineer,* with which *Mines and Minerals* previously had been consolidated, was absorbed by COAL AGE.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During eighteen years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody and Sydney A. Hale. The editorial staff of COAL AGE consists of: Sydney A. Hale, R. Dawson Hall, J. H. Edwards, Louis C. McCarthy, Ivan A. Given and A. F. Brosky.

Coal Slogan Committee Is Named

Representatives of the bituminous operators, anthracite operators, wholesalers and retailers in the persons of Harry L. Gandy, executive secretary, National Coal Association; Daniel T. Pierce, vice-chairman, Anthracite Operators' Conference; Ira C. Cochran, commissioner, American Wholesale Coal Association, and Joseph E. O'Toole, resident vice-president, National Retail Coal Merchants' Association, will compose the executive committee of the Coal Slogan Prize Contest, which closes Feb. 28, 1930.

Judges in the contest, which were named previously, are as follows: Dr. Julius Klein, assistant Secretary of Commerce; R. H. Aishton, president, American Railway Association; Charles C. Younggreen, president, Advertising Federation of America; C. E. Bockus, president, National Coal Association; Daniel T. Pierce, vice-chairman, Anthracite Operators' Conference; Warren Bixler, president, American Wholesale Coal Association, and Milton E. Robinson, Jr., president, National Retail Coal Merchants' Association.

General Coal Buys Crozer

Five operating companies in the Pocahontas field of West Virginia and one sales organization were taken over Jan. 1 by the General Coal Co., Philadelphia, Pa. The mining companies, which have a combined annual production of about 2,000,000 tons, are the Crozer Coal & Coke Co., and the Upland Coal & Coke Co., Elkhorn, W. Va.; Page Coal & Coke Co., Pageton, W. Va.; Powhatan Coal & Coke Co., Powhatan, W. Va., and Peerless Coal & Coke Co., Vivian, W. Va. The sales organization taken over by the General company is the Crozer-Pocahontas Co., Philadelphia, Pa., agent for the Upland, Page and Crozer companies.

Because of the affiliation of the Chicago, Wilmington & Franklin Coal Co. and the General Coal Co. in the smokeless coal fields of West Virginia, the former will distribute, in the Chicago and western territory, the Crozer coals heretofore handled by the Crozer-Pocahontas Co.

Midwest Coal Conference

Topics of interest to bituminous coal producers, distributors, manufacturers of coal-burning equipment and consumers will be discussed at the Midwest Bituminous Coal Conference, to be held under the direction of the Engineering Schools of Purdue University, the Coal Trade Association of Indiana and the Illinois Coal Bureau, at Lafayette, Ind., April 9-11, 1930. This three-day educational conference is the outgrowth of the Indiana Fuel Conference which has been offered by the university for the past two years. The program is being arranged by a committee consisting of Jonas Waffle, Coal Trade Association of Indiana, Terre Haute, Ind.; A. W. Cole, Purdue University, and B. R. Gebhart, Illinois Coal Bureau. Chicago. W. A. Knapp, Engineering Extension Department, Purdue University, is general chairman.

Plans for increased mining activities in Colorado during 1930, particularly in regard to co-operation with the U. S. Geological Survey, will be discussed at the seventeenth annual meeting of the Colorado Mining Association, to be held jointly with the thirteenth annual convention of the Colorado chapter, American Mining Congress, at Denver, Colo., Jan. 21-22. Other business will include discussion of a proposed revision of freight rates by the Interstate Commerce Commission.

Coal Mining Men to Serve On Business Board

Representatives of the coal-mining industry will serve on the larger advisory body which will be the point of contact between the National Business Survey Conference Committee, the executive committee organized to direct business effort to the achievement of the purpose of the National Business Survey Conference (*Coal Age*, December, 1929, p. 769) held in Washington, D. C., Dec. 5, under the auspices of the Chamber of Commerce of the United States and the trade associations.

The advisory committee will transmit to the executive committee periodical information as to the business conditions in the many lines of industry and will follow up within the industries suggestions that may come from the executive body. Its membership was selected with the co-operation of the trade associations, and among those who have accepted appointments are: C. E. Bockus, New York City, president, National Coal Association, and chairman of the board, Clinchfield Coal Corporation; S. D. Warriner, Philadelphia, Pa., chairman, Anthracite Operators' Conference, and president, Lehigh Coal & Navigation Co., and Milton E. Robinson, Jr., Chicago, president, National Retail Coal Merchants' Association.

Glen Alden Changes

Following the formal acquisition of the Lehigh & Wilkes-Barre Coal Co. by the Glen Alden Coal Co., Jan. 31, the following changes in personnel of the latter company were made: chairman of the board, C. F. Huber; president, William W. Inglis; vice-president and general manager, S. D. Dimmick; assistant to the general manager, P. H. Dever; vice-president and general counsel, C. E. Ash; treasurer, G. N. England. Mr. Huber was formerly president of the Lehigh & Wilkes-Barre company. Two new general superintendents were also appointed, as follows: George V. O'Hara, in charge of the northern division, embracing collieries in Lackawanna County and west of the Susquehanna River in Luzerne County; Edward Griffith, in charge of the southern division, embracing collieries east of the Susquehanna River and those in the Lehigh area.

Fire Destroys Tipples

The tipple, conveyor and headhouse of the Mary Helen Coal Corporation, at Good Coal, Harlan County, Ky., was totally destroyed by fire Dec. 21, with an estimated loss of $155,000, $99,000 of which was covered by insurance. Officials of the company contemplate rebuilding at once.

A loss of approximately $65,000 was incurred in the destruction of the mine tipple of the Bear Canon Coal Co., Bear Canon, Trinidad district, Colo., Dec. 17.

Bureau of Mines Issues Permissible Plates

Two approvals of permissible mine equipment were issued by the U. S. Bureau of Mines during the month of December, as follows:

(1) Sullivan Machinery Co.; Type CLE-2 longwall mining machine; 30-hp. motor, 220 volts, a.c.; Approval 181; Dec. 2.

(2) Oldroyd Machine Co.; Type L-2 loading machine; 13 Westinghouse motors, aggregating 117 hp., and Westinghouse control, 250 volts, d.c.; Approval 182; Dec. 9.

Waste of Mineral Wealth To Be Studied

A study designed to check the present waste of mineral resources due to overproduction has been initiated by the American Mining Congress. The investigation will be undertaken by the following committee, representing the various branches of the mining industry: Clinton H. Crane, St. Joseph Lead Co., New York City; Ralph M. Roosevelt, American Zinc Institute, New York City; C. E. Bockus, National Coal Association, New York City; F. H. Brownell, American Smelting & Refining Co., New York City; S. L. Mather, Cleveland-Cliffs Iron Co., Cleveland, Ohio; S. D. Warriner, Lehigh Coal & Navigation Co., Philadelphia, Pa., and E. B. Reeser, American Petroleum Institute, Tulsa, Okla.

In addition to a study of the waste of mineral resources, the committee will survey the situation in relation to the waste of capital and labor involved in such overproduction. The difficulty of meeting the situation as a result of restrictions under the anti-trust laws will be gone into and an attempt made to seek a solution to the problem in order that natural resources may be conserved and mining placed on a more sound and businesslike basis.

Coal Interests Merge

The Central Pocahontas Coal Co., Welch, W. Va., operating twelve mines in southern West Virginia, and the F. M. Hall Coal Co., the Chicago selling organization of the company, have been taken over by the Cory Mann George Corporation, New York City. Included in the absorption is the Crystal Block Coal & Coke Co. and the Crystal Block Mining Co.

Watson Again Introduces Coal Commission Bill

Senate Bill 4490, the legislative proposal of the United Mine Workers for a bituminous coal commission, which became a dead letter with the adjournment of the 70th Congress, has been resurrected under a new number—S.2888. Senator Watson, former chairman and now a member of the Senate Interstate Commerce Committee, reintroduced the bill the week of Jan. 4.

National Miners' Union Stages Brief Strike

Workers affiliated with the National Miners' Union—the organization with Communistic leanings—staged a brief and unsuccessful strike in Illinois last month. The chief center of dissatisfaction was around Taylorville. State troops were called out to prevent serious disorders. After a few days the strike petered out.

About the same time workers affiliated with the United Mine Workers in western Kentucky voted in favor of a strike. A few men walked out, but there was no real interference with production in the field. Announcement was made a few days ago that an attempt would be made to reorganize the shattered forces of the union in eastern Ohio. Quiet organizing still continues in southern West Virginia.

Arguments were heard before the Circuit Court of Sangamon County in Illinois on the petitions of the officials international of the United Mine Workers to dissolve the injunction issued against them some weeks ago barring their ouster of Harry Fishwick and other leaders of district 12. At the same time the plea of the Illinois mine leaders to have the injunction made permanent also was heard. The court took the case under advisement and a decision is expected this month.

Smokeless Operators Elect

At the annual meeting of the Smokeless Coal Operators' Association of West Virginia, held at the Vanderbilt Hotel, New York City, P. M. Snyder, president, C. C. B. Smokeless Coal Co., Mt. Hope, W. Va.; R. H. Knode, president, Stonega Coke & Coal Co., Philadelphia, Pa., and H. R. Hawthorne, secretary, Pocahontas Fuel Co., Inc., New York City, were re-elected president, first vice-president and second vice-president and treasurer, respectively. Holly Stover was again chosen secretary.

At the annual meeting of the New River Coal Operators' Association, held at Beckley, W. Va., Dec. 5, M. L. Garvey, general manager, New River Co., Macdonald, W. Va.; R. H. Morris, general manager, Gauley Mountain Coal Co., Ansted, W. Va.; P. M. Snyder, president, C. C. B. Smokeless Coal Co., Mt. Hope, W. Va., and Stanley C. Higgins, Mt. Hope, W. Va., were re-elected president, vice-president, treasurer, and secretary respectively. On the same day, at the annual meeting of the Winding Gulf Operators' Association, W. A. Richards, Bluefield, W. Va., president, Pemberton Coal & Coke Co., was re-elected president, and Alex Laing, Beckley, W. Va., secretary.

The Pittsburgh Coal Co. has acquired the physical properties of the Schenley Fuel & Supply Co., one of the largest retail coal distributing companies in Pittsburgh, Pa.

American Mining Congress Plans Convention

Active preparations are being made by the Manufacturers' Division of the American Mining Congress for its seventh annual convention of practical coal operating men and national exposition of coal mining machinery, equipment and supplies, which will be held at Cincinnati, Ohio, the week of May 5-10. This event will draw to the Queen City the practical operating men of the various coal districts of the nation for the consideration of mining methods and related problems.

P. C. Thomas, Pittsburgh, Pa., general manager of mines for the Koppers Co., Inc., will be the chairman of the program committee, which will hold its first meeting Jan. 11 at Pittsburgh. This committee will include an advisory group of leading operators and mining engineers and a representative group from the various coal fields, both anthracite and bituminous. Coal men invited to participate in drafting the program and who are accepting this designation are as follows:

Advisory Committee — Paul Weir, vice-president, Bell & Zoller Coal & Mining Co., Zeigler, Ill.; Dr. L. E. Young, vice-president, Pittsburgh Coal Co., Pittsburgh, Pa; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago; W. L. Affelder, vice-president, Hillman Coal & Coke Co., Pittsburgh, Pa.; Ezra Van Horn, general manager, Clarkson Coal & Mining Co., Cleveland, Ohio; Newell G. Alford, Howard N. Eavenson & Associates, Pittsburgh, Pa.

General Committee—Alabama: J. A. Long, district manager, Woodward Iron Co., Woodward; D. A. Thomas, president, Montevallo Coal Mining Co., Birmingham.

Arkansas and Oklahoma: Franklin Bache, president Kali-Inla Coal Co., Philadelphia; V. C. Robbins, mining engineer, McAlester Fuel Co., McAlester, Okla.

Colorado: R. L. Hair, general superintendent, fuel department, Colorado Fuel & Iron Co., Pueblo; B. W. Snodgrass, general manager, Victor-American Fuel Co., Denver.

Illinois: F. S. Pfahler, Superior Coal Co., Gillespie,

Indiana: Robert J. Smith, Princeton Mining Co., Terre Haute; Carl Fletcher, president, Fletcher Coal Co., Indianapolis.

Kansas-Missouri-Iowa: K. A. Spencer, chief of engineering, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.; Ira Clemens, president, Clemens Coal Co., Pittsburg, Kan.

Kentucky: W. G. Duncan, Jr., superintendent, W. G. Duncan Coal Co., Greenville; L. B. Abbott, division engineer, Consolidation Coal Co., Jenkins.

Maryland: R. P. Maloney, president, Lindsey Coal Mining Co., Oakland; W. J. Wolf, manager, Consolidation Coal Co., Frostburg.

New Mexico: H. D. Moses, manager, Gallup-American Coal Co., Gamerco.

P. C. Thomas

Chairman of the program committee of the American Mining Congress and manager of mines for the Koppers Co., Inc., Pittsburgh, Pa., has been actively engaged in coal mining in various capacities from chief engineer to general manager since 1911. His first position was with the New River Co., and later he was employed by the East Gulf Coal Co. and the New River & Pocahontas Consolidated Coal Co., before going with the Koppers company.

Ohio: W. E. Tytus, president, Sunday Creek Coal Co., Columbus; Barney Clay, M. A. Hanna Co., Cleveland.

Pennsylvania (anthracite): E. W. Lamb, assistant general manager, Scranton Coal Co., Scranton: R. E. Hobart, mechanical superintendent, Lehigh Coal & Navigation Co., Lansford.

Pennsylvania (bituminous): S. W. Blakslee, general superintendent Pennsylvania Coal & Coke Corporation, Cresson; George J. Krebs, superintendent, Reading Iron Co., Stoyestown; Thomas Dawson, vice-president, H. C. Frick Coke Co., Pittsburgh; M. D. Cooper, Hillman Coal & Coke Co., Pittsburgh.

Utah: D. D. Muir, United States Fuel Co., Salt Lake City; George Scholtz, Liberty Fuel Co., Latuda.

Virginia: J. D. Rogers, Stonega Coke & Coal Co., Big Stone Gap; Lee Long, vice-president, Clinchfield Coal Corporation, Dante.

West Virginia: P. C. Graney, general manager, C. C. B. Smokeless Coal Co., Mount Hope; W. A. Hunt, general superintendent, Island Creek Coal Co., Holden; Thomas G. Fear, general manager of operations, Consolidation Coal Co., Fairmont; George W. Craft, general superintendent of mining, Pocahontas Fuel Co., Pocahontas.

Wyoming: George B. Pryde, vice-president, Union Pacific Coal Co., Rock Springs; R. E. Miller, Sheridan-Wyoming Coal Co., Kleenburn.

The Caples mine of the Central Pocahontas Coal Co., near Welch, W. Va., has been acquired by the Berwind-White Coal Mining Co., Philadelphia, Pa.

Trade Practice Code Adopted By Dock Operators

Lake Superior commercial coal dock operators at a trade practice conference held at the Congress Hotel, Chicago, Jan. 4, under the auspices of the Federal Trade Commission, adopted a set of sixteen rules on standardization of sizes of bituminous coal; guaranteeing to buyers specific British thermal units or other chemical contents of coal; duplication by dock companies of contracts previously made by other dock companies with retail dealers or consumers—that is, consumers from retailers—and uniform sales contracts.

Eighteen of the nineteen dock operators, representing 95 per cent of the tonnage handled, were present, as well as representatives of the rail interests, wholesalers and retail organizations of the Northwest and observers from the National Coal Association and the National Retail Coal Merchants' Association. Federal Trade Commissioner Charles H. March conducted the conference, assisted by Judge M. Markham Flannery, director of the division of trade practices of the Commission. John Maher, manager, Maher Coal Bureau, acted as secretary.

Berwind-White Changes

Edward J. Berwind has retired from the presidency of the Berwind-White Coal Mining Co., becoming chairman of the board, and has been succeeded by Charles E. Dunlap. H. A. Berwind and Thomas Fisher also have retired as vice-presidents, but continue as directors. Charles G. Berwind has been made vice-president in charge of operations.

The new president, Mr. Dunlap, was born in Philadelphia in 1888 and entered the employ of the New River & Pocahontas Consolidated Coal Co., a subsidiary of Berwind-White, in 1911. He remained with that company in various capacities until 1914, when he entered the New York office of the latter company. Here he was, in succession, manager of the foreign department, assistant to the president and, upon the death of John E. Berwind in 1928, vice-president and director before becoming president.

Oklahoma Blast Kills 59

An explosion in the North McAlester, Okla., mine of the Old Town Coal Co., Dec. 17, killed 59 men. Of the total of 64 in the mine at the time, five were rescued alive. The mine workings are reached by a shallow slope and operations were carried out with closed lights. While the cause of the explosion has not definitely been announced, it is reported that it was caused by a spark from a cutting machine. Only a few of the miners were killed by the force of the blast, most of them succumbing to the carbon monoxide which filled the workings immediately after.

Bockus Names Committees

C. E. Bockus, president, National Coal Association, has announced the personnel of the Market Research Institute, the Government Relations Committee and the Safety Committee for the coming year. Walter Barnum, president, Pacific Coast Co., and Rice Miller, vice-president, Hillsboro Coal Co., are, respectively, chairman and vice-chairman of the Institute.

Chairmen and vice-chairmen of the different sections are as follows: Trade Practice Section, E. C. Mahan, president, Southern Coal & Coke Co., and R. H. Knode, president, Stonega Coke & Coal Co.; Trade Relations Section, H. A. Glover, general manager of sales, Consolidation Coal Co., and Calvin Holmes, president, Holmes-Darst Coal Co.; Technical Research Section, Henry T. DeBardeleben, president, DeBardeleben Coal Corporation, and Douglas Gorman, president, Cumberland Coal Co.; Publicity Section, Grant Stauffer, president, Sinclair Coal Co., and W. M. Wiley, vice-president, Boone County Coal Corporation; Commercial Research Section, R. H. Sherwood, president Central Indiana Coal Co., and W. B. Lewis, president, Oakdale Coal Co.; Cost Accounting Section, F. A. Fontyn, vice-president, Ebensburg Coal Co., and D. D. Hull, Jr., vice-president, Virginia Iron, Coal & Coke Co.; Conservation Section, H. R. Hawthorne, secretary, Pocahontas Fuel Co., Inc., and R. L. Wildermuth, president, Lorado Coal Mining Co.

Five members were appointed on the Government Relations Committee, as follows: Charles O'Neill (chairman), vice-president, Peale, Peacock & Kerr, Inc.; W. H. Coolidge, chairman of the board, Island Creek Coal Co.; W. H. Cunningham, president, Truax-Traer Coal Co.; William J. Jenkins, president, Consolidated Coal Co. of St. Louis, and Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co.

Ezra Van Horn, vice-president, Clarkson Coal Mining Co., is the new chairman of the Safety Committee. Other appointees are as follows: George Dunglinson, Jr., president, Vulcan Colliery Co.; John P. Gorman, president, John P. Gorman Coal Co.; Otto Herres, assistant manager, United States Fuel Co.; A. R. Pollock, general manager of mines, Ford Collieries Co.; Geo. W. Solomon, vice-president, Panther Creek Mines, Inc.; C. N. Templeton, vice-president, Templeton Coal Co., and D. A. Thomas, president, Montevallo Coal Mining Co.

Makes Safety Record

The Sheridan-Wyoming Coal Co., Inc., and its subsidiary, the Hotchkiss Coal Co., have finished another year without a fatal accident in any of their three Wyoming mines. This makes the fifth consecutive year for the two companies without the loss of a single life in or about the mines, producing during that time 4,434,780 tons.

Coal Loadings to Rise 2.8 Per Cent

Coal and coke shipments during the first quarter of 1930 will show an increase of 2.8 per cent, as compared to the corresponding period in 1929, according to estimates submitted to the Car Service Division of the American Railway Association by the various shippers' regional advisory boards. Aggregate loadings of coal and coke are expected to be 2,903,720 cars in the first quarter of 1930, as compared to actual loadings of 2,825,398 cars in the same months in 1929. On the other hand, carload shipments of 29 principal commodities, including coal and coke, will approximate 7,664,499 cars, a reduction of 43,905 cars below the figure in 1929, or 0.6 per cent.

Of the thirteen boards, five anticipate an increase in loadings in their respective districts. These are the Atlantic States, Allegheny, Ohio Valley, Central Western and Southwestern. Of these five, the Allegheny, Atlantic States and Ohio Valley boards ascribe the increase, in part, to heavier shipments of coal and coke.

Personal Notes

JOHN G. MILLHOUSE, state mine inspector for the Sixth District of Illinois, with headquarters at Litchfield, has been appointed director of the Illinois Department of Mines and Minerals, vice A. D. Lewis, resigned. Mr. Millhouse was born in England in 1871. Until 12 years ago, when he became state mine inspector, he was in succession employed by the Spring Valley Coal Co., La Salle County Carbon Coal Co., and the Illinois Third Vein Coal Co. PETER JOYCE, Springfield, was appointed assistant director with Mr. Millhouse.

T. W. ENGLISH, Brownsville, Pa., for 28 years employed by the H. C. Frick Coke Co., has been made general manager of the Pocahontas-New River division of the Consolidation Coal Co., with headquarters at Coalwood, W. Va. Mr. English succeeds Franklin K. Day, who resigned after eight years at Coalwood and after nearly a quarter of a century with the Consolidation Co.

RALPH KNODE, president, Stonega Coke & Coal Co., Philadelphia, Pa., has been elected a director at large of the National Coal Association to succeed the late Otis Mouser.

F. H. SACKETT, U. S. Senator from Kentucky and president of the Black Star Coal Co., Louisville, Ky., has accepted an appointment as Ambassador to Germany. In addition to being president of the Black Star company, Senator Sackett is connected with the Sackett-Speed interests, which control the Byrne & Speed Coal Co., North Jellico Coal Co., Beaver Dam Coal Co., and Pioneer Coal Co.

CHARLES ENZIAN, formerly mining engineer, Berwind-White Coal Mining Co., Windber, Pa., has accepted the position of chief engineer for the Consolidation Coal Co., and will make his headquarters in Fairmont, W. Va. Mr. Enzian was born in Weissport, Pa., in 1877, and after graduation from Lehigh University in 1901 went with the Lehigh Coal & Navigation Co. in an engineering capacity. In 1902, he accepted a position with the Lehigh Valley Coal Co., and in 1905 was made division engineer, serving until 1910, when he became mining engineer for the U. S. Bureau of Mines in charge of work in the anthracite region. This position he held until going with the Berwind-White company, seven years ago.

GEORGE A. G. WOOD, who has been associated with the Massachusetts Companies for the last 23 years, has resigned. Mr. Wood was executive vice-president of the Massachusetts company and vice-president of the New England Fuel & Transportation Co. and the New England Coal & Coke Co.

WALTER A. JONES, statistician of the Central Pennsylvania Coal Producers' Association since its organization in 1918, has been elected secretary-treasurer, vice Charles O'Neill, resigned. Mr. Walters went to Altoona from Washington, D. C., where he was chief accountant in the coal section of the Federal Trade Commission. Prior to his work in Washington he practiced engineering, principally railroad construction and railroad valuation work.

J. P. HAMBY, formerly foreman at Lynch, Ky., for the United States Coal & Coke Co., has been made superintendent of the Harlan Fox Mining Co., Black Joe, Ky.

JAMES LAMONT has been promoted to the position of general manager in charge of operations of the Sterling Coal Co., Elmore, Pa. CHARLES HANNIGAN has been advanced to the position of superintendent.

R. W. Morris Dead

ROBERT W. MORRIS, 56, New York manager for the *Black Diamond*, died of heart failure at his home in Richmond Hill, New York City, Dec. 20. Mr. Morris was born in Pittston, Pa., and one of his first jobs was as a reporter on a Pittston newspaper. In 1897 he became a coal salesman for C. C. Bowman, a Pittston anthracite operator, with headquarters in New York. In 1897, he joined the staff of the City News Association and at the time of his retirement was day manager. Mr. Morris was New York market correspondent for *Coal Age* since its beginning in 1911, and was news editor for the years 1923-24. He was one of the founders of the New York Newspaper Club.

Obituary

B. F. NIGH, secretary-treasurer, Michigan-Ohio-Indiana Coal Association, died in his office in Columbus, Ohio, Jan. 6, of acute indigestion. Mr. Nigh, who was 46, was one of the best known coal association executives in the Middle West.

DR. EDGAR E. FYKE, president, Marion County Coal Co., Centralia, Ill., died Dec. 31, at San Antonio, Texas. Besides his coal affiliations, Dr. Fyke was active in the operation of the Centralia Envelope Co. and was a director of the Old National Bank.

HERBERT DUPUY, president, Central Connellsville Coke Co., Crucible Steel Co. of America and Pennsylvania Rubber Co., died at his home in Pittsburgh, Pa., Jan. 10. He was 75 years old.

E. M. GROSS, 79, a director of the Keystone Coal & Coke Co., died at his home in Greensburg, Pa., Jan. 11. Mr. Gross was a pioneer coal man in Westmoreland County, having been associated in the organization of the Carbon Coal Co. and the Claridge Gas Coal Co., which were later merged with others to form the Keystone company. He also organized the Latrobe - Connellsville Coal & Coke Co., of which he was secretary at the time of his death and, in addition, was president of the Delmont Gas Coal Co.

THOMAS GERALD CONDON, vice-president, Southwestern Coal & Iron Co., and director, Curtis Coal Co., died Jan. 1 at his home in New York City. Mr. Condon, who was 66 years old, engaged in coal and iron smelting in Colorado and New Mexico in the early 80s.

NICHOLAS D. MONSARRAT, 56, president, Monsarrat Mining Co., Bemis, W. Va., died at his home in Columbus, Ohio, Dec. 18, following an illness of several years. Mr. Monsarrat's first position in the coal industry was that of vice-president and general manager, Sunday Creek Coal Co., after which he became interested on his own account.

WILLIAM J. SAMPSON, president of the Witch Hazel Coal Co., operating mines at Cadiz, Ohio, died Dec. 26 at the home of his son in Cleveland, Ohio. In addition to his interests in the coal business, Mr. Sampson was a director in the First National-Dollar Banks, and served on the membership, government relations, cost accounting and publicity committees of the National Coal Associations.

CHARLES A. HURFF, 56, vice-president and treasurer, Philadelphia & Reading Coal & Iron Co., died of pneumonia at his home in Philadelphia, Pa., Dec. 28. Mr. Hurff, at the time of his death, had been in the employ of the Reading company 37 years.

CAPTAIN I. P. BARNARD, 83, secretary, Beaver Dam Coal Co., Beaver Dam, Ky., died at his home in Louisville, Ky., Dec. 21. Captain Barnard, soon after being mustered out of the Confederate Army in 1865, established one of the first mines in the region around Beaver Dam, and was at one time president of the Williams Coal Co., Mannington, Ky.; general manager of the Taylor Coal Co., and later president of the Beaver Dam company.

Coming Meetings

American Institute of Electrical Engineers, annual winter convention Jan. 27-31, 1930, at 29 West 39th St., New York City.

First International Heating and Ventilating Exposition; Jan. 27-31, 1930, at Commercial Museum, Philadelphia, Pa.

American Wood Preservers' Association; annual meeting Jan. 28-30, 1930, at Seattle, Wash.

Eastern Ohio Coal Operators' Association; annual meeting, Feb. 10, at Cleveland, Ohio.

American Institute Mining and Metallurgical Engineers; annual meeting Feb. 17-21, 1930, at Engineering Societies Building, 29 West 39th St., New York City.

Canadian Institute of Mining and Metallurgy; annual meeting, March 5-7, at Toronto, Ontario, Canada.

American Mining Congress; annual Convention of Practical Coal Operating Men and National Exposition of Coal Mining Machinery and Equipment, May 5-10, at Cincinnati, Ohio, under auspices of Manufacturers' Division.

Second World Power Conference; June 16-25, 1930, Berlin, Germany.

King Coal's Calendar for December

Dec. 6—Miners at Kurri Kurri and Cessnock, Australia, vote to reject the terms of an agreement made by representatives of the operators and miners providing for a wage cut in the settlement of the Australian coal dispute. Following the action of the miners, the Labor Council decided to advise the miners to declare a general strike unless the owners reopen the mines on the conditions prevailing before the stoppage. Little likelihood of general strike exists, however.

Dec. 7—National Miners' Union calls a strike in the Illinois coal fields, its effects, however, being confined largely to those mines of the Peabody Coal Co. in the neighborhood of Taylorville, Ill. A six-hour day and a five-day week, minimum wage of $35 a week and abolition of the check-off comprise the strikers' demands.

Dec. 9—Orders for the immediate mobilization of the 130th Infantry and the 106th Cavalry, Illinois National Guard, for service in the strike area around Taylorville, Ill., issued by Adjutant General Carlos M. Black.

Dec. 11—W. D. Duncan, district president, United Mine Workers, announces that union coal miners in the western Kentucky field vote 8,386 to 193 in favor of a strike to enforce recognition of the union and restoration of the 1917 wage scale. Operators express doubt that a strike will be sanctioned by the international organization.

Dec. 11—Representatives of the Anthracite Co-operative Association, headed by Roy C. Haines, executive vice-president, ask Secretary of Commerce Lamont to make an economic survey of the anthracite region. Mr. Haines expressed the opinion that the proposed survey would lead to a reduction in the cost of anthracite.

Dec. 11—British Coal Mines Bill, providing machinery for enforcement of marketing schemes and for regulating the production, marketing and sale by the owners of coal mines; the reduction of the miners' working day from eight to 7½ hours, and the establishment of a national board to regulate wages, conditions of work and hours in the mines, introduced in the House of Commons.

Dec. 12—Announcement made that an official Liberal amendment to the British Coal Mines Bill would be made when it comes up for the second reading, Dec. 17. The Liberals will seek rejection on the grounds that the bill does nothing to promote reorganization of the industry or to secure reduction of costs through higher efficiency but, on the contrary, gives statutory vested interests to inefficient mines, curtails the production of efficient collieries, subsidizes coal supplied to competing manufacturers abroad, increases the price to British consumers and burdens the users generally. The clauses to which the Liberals take particular exception are those concerning the marketing schemes and others giving the right to levy upon domestic coal to supply export demand where necessary.

Dec. 12—Platform for the promotion of peace and prosperity in the anthracite region adopted at the Anthracite Regional Economic Conference, held at Wilkes-Barre, Pa., under the auspices of the Anthracite Co-operative Association. Eleven planks are adopted, affirming the faith of the people in the industry, commending the co-operation of the United Mine Workers in working out a solution to the common problem and calling on all to back a program of cost reduction and better service through good will, mutual confidence and team work.

Dec. 15—Forty-one strikers wounded by police in beating off an attack on the Rothbury colliery, which the State Government of New South Wales, Australia, had announced would be reopened with volunteer labor. The strikers had refused to accept the terms of a previous agreement entered into between representatives of the owners and miners.

Dec. 17—Fifty-nine miners killed and five rescued alive in an explosion in the mine of the Old Town Mining Co., McAlester, Okla.

Dec. 18—Miners at the No. 7 mine of the Peabody Coal Co., Kincaid, Ill., unanimously vote to return to work, breaking the back of the strike called by the National Miners' Union in the Taylorville region, Dec. 7.

Dec. 19—British Coal Mines Bill passes second reading by a margin of eight votes, 281 for the MacDonald government and 273 against, almost forcing another election on the country. The bill will be taken up in the Committee of the Whole of the House of Commons after the holidays for amendments.

Dec. 19—Several hundred miners in western Kentucky strike without the sanction of the United Mine Workers in protest against what they term unsatisfactory conditions. Mines affected include those of the Duncan Coal Co., in Muhlenberg County, and the Louisville Gas & Electric Co. in Ohio County.

Dec. 26—Stockholders approve acquisition of the Lehigh & Wilkes-Barre Coal Co., Wilkes-Barre, Pa., by the Glen Alden Coal Co., Scranton, Pa., the consideration being 676,000 shares of Glen Alden stock.

Dec. 27—Two men killed and twelve others escape in an explosion at the Stotesbury mine of the C. C. B. Smokeless Coal Co., Stotesbury, Raleigh County, W. Va. The cause is thought to be the ignition of a pocket of gas.

Coal Mining Institute Throws Calcium Light on Safety

SAFETY received paramount consideration at the 43d annual meeting of the Coal Mining Institute of America, held at Pittsburgh, Pa., in the Chamber of Commerce Auditorium, Dec. 11 and 12. At the morning session of the first day these officers for the ensuing year were elected: Robert M. Lambie, president; George S. McCaa, Thomas S. Lawther and Edward W. Wilkinson, vice-presidents, and W. E. Fohl, secretary-treasurer. The following were selected as managing directors: Ralph C. Beerbower, Clyde L. Lutton, Silas S. Hall, James D. Walker, Francis Feehan, Oscar Cartlidge, D. L. Brown, William B. Wardrop, Edward Austin and John I. Thomas.

Retiring president William Nisbet in his annual address said that Pennsylvania mined more tons of coal per fatality in 1892 than in 1928. Clyde C. McDowell, safety and personnel director, Pittsburgh Coal Co., Pittsburgh, Pa., described the safety practices of his company in regard to coal cutting. A motion-picture film has been produced by the company which shows just how it requires that a cutting machine be operated.

Mr. McDowell said that it was found that the best way to block a track was to place a tie or a split post across the two rails and to lay a cross timber of a similar kind across the first, resting at one end on the ground and on the other end on the first timber, the lower end being toward the machine, locomotive or car which it was designed to halt.

Some fatalities have arisen from high-speed sumping, and to eliminate these the company requires that the handling rope be anchored on the left side of the machine in sumping on the right side of the working face and that the feed rope be anchored on the right side of the machine. In this way, not only is the speed of sumping decreased so that the machine is less likely to back up but the machine runner can see the jack post and handling rope at all times, thus reducing the risks of operation.

THE helper is instructed to shovel on the left rear of the machine so that if his hand shovel strikes against the bits, as he is shoveling almost in the direction of their motion, he will not be so likely to be thrown down by the contact as if he were shoveling the other way. Safety posts are set behind the machine as it progresses and the posts which are in its line of advance are one by one removed. Men are instructed not to stand at the cutting end of the machine when unloading or loading it from its truck. The cutting crew wear glass goggles when making holes in the roof and in the floor for the reception of the ends of the jack posts. It was suggested by another speaker that a good rule to establish would be that the cutting chain should be in reverse when inserting bits.

In the answer to the first question in the question box, "are all coal-mine explosions preventable?" attention was drawn to the experience at Coalwood, W. Va., where, by the use of every known precaution, a highly gaseous mine ("more a gas well than a coal mine," according to the narrator) had been operated without an explosion.

IN discussing question 2 on the program, Richard Maize said that the unsealing of a coal-mine fire might have to be delayed if the fire had developed a good start, for the sensible heat in the pillar might rekindle the fire when air was re-admitted. The surface heat might be low enough to be reassuring but back of it might be heat enough for the rekindling. It was said that at the Woodward mine of the Glen Alden Coal Co., near Wilkes-Barre, Pa., a fire in a seam 27 ft. thick had extended a total distance of 1,500 ft. Though water was used in the section and though some natural ventilation of inert gases had reduced the temperature, the thermometer reading was still 200 deg. F.

Paul F. Lewis, Wilkinsburg, Pa., discussed "The Safe Handling of Explosives." He was of the opinion that when explosives failed it was often due to improper detonation. Sometimes it was clear that the cap had exploded but not with sufficient violence to detonate the charge. This might be due to insufficient current or to the cap having become damp. Again the detonator might have been incorrectly placed. It should be, he said, located at the outer end of the cartridge last placed in the hole and should be directed so as to fire in an axial direction toward the end of the hole, for the pressure will increase as the explosion travels and it is at the end of the hole where the greatest pressure is needed. The pressure should be least on the tamping, which may not be sufficiently tight to resist the stress placed upon it.

Mr. Lewis declared that even liquid nitroglycerine had a variable rate of detonation ranging from 8,000 to 23,600 ft. per second, depending on the nature of the initiating force. Most states require that when a shot has failed another hole shall be placed 18 in. away from the first. This hole should be sunk parallel with the other, for its purpose is not to fire the powder in the first hole but to throw the unexploded shot down with the coal into which it was inserted.

He advocated that air spacing, if provided, be around the cartridge rather than on the end of the charge, for if placed at the end the pressure at the end of the hole would be diminished, and there the maximum pressure is desirable.

A detonator has a definite direction of action. If two half cartridges are laid on a flat surface with the adjacent ends 24 in. apart and one is provided with a fuse with the "business end" toward the other, the one with the fuse will fail to fire and the other toward which the fuse is pointing will fire though 2 ft. away. The business end is that which contains the pressed charge of detonating material backed by the loose charge of detonating substance and the 0.0015 in. diameter firing wire. The other end contains the leads surrounded by tar and sulphur poured into the cylinder in a molten condition.

Oscar Cartlidge not being present to present his paper, E. J. Weimer, Wildwood, Pa., described the Wildwood mine. At the banquet in the evening the speakers were the Rev. E. A. Hodil, Uniontown, Pa.; Dean Edward Steidle, Pennsylvania State College, State College, Pa.; Erskine Ramsay, Birmingham, Ala.; William Nisbet and R. M. Lambie.

At Thursday's session, J. V. Berry, Johnstown, Pa., discussing "The Use and Misuse of Gas Masks," said that some mine fires had been fought with no other breathing equipment than gas masks, but in every case a man with a flame safety lamp should precede the men with such masks, so as to protect them in their advance.

Fred R. Vinton replaced L. W. Householder, general manager, Rochester & Pittsburgh Coal & Iron Co., Indiana, Pa., who was sick, in describing coal preparation at the mines of that company. An analysis of the coal had been made by sections of the bed and by sizes of the coal at the screens. It was ascertained that the bottom 12 in. contained 15 per cent ash. By excluding this the ash content could be lowered to 8 per cent. By cutting out a somewhat dirty seam with an arcwall cutter and loading it out separately, the rest of the coal could be brought to have an average ash content of 7 per cent.

IN order to know just what the conditions are, a truck is brought around twice a month to each tipple. Careful samples are made and the coal analyzed. The division engineer also takes samples at the face of the entries and at different elevations in the coal seam. In consequence, it is possible to know just what kind of coal will be available twelve or eighteen months later.

The question box, being opened by W. L. McCoy, Crafton, Pa., discussion followed on roof jacks. H. D. Mason, Ebensburg, Pa., said that Revloc has discontinued the use of roof jacks, as the roof was too uncertain. Alexander Jack, state inspector, Crafton, Pa., said they had been used with the scoop system and they had proved satisfactory, but irregular work had made the use of scoops impossible, so the places are now idle. H. I. Smith,

U. S. Geological Survey, Washington, D. C., remarked that pipe with jacks above them had been used in Vesta mines as early as 1913. J. C. White, Pittsburgh Coal Co., Pittsburgh, Pa., said that jacks were used in the mines of the company to afford protection around machines but not for break rows against falls. They weighed 30 to 35 lb. and were provided with a 6x12-in. base.

John F. Bell, Pennsylvania mine inspector, Dravosburg, Pa., answered the question as to the distance a mine car should be placed from the loading face by saying that men frequently were caught beneath a fall of slate or coal because cramped between the end of the car and the working face. The car should not be taken close to the end of the room till all the hanging coal has been taken down. It should be pushed out before the drawslate is attacked by bars and not be taken back again till all danger from slate is removed. With cars 12 ft. long the loader likes to have his car as near to the edge of the fallen coal as possible and in consequence often runs desperate risks of being buried under a fall of coal or slate.

THE life of a composite steel car in or out of service was next discussed. One member said that plain steel should last from 6 to 10 years but that with 0.25 per cent copper-steel cars should remain in service 50 per cent or more longer. The railroad experience is that copper adds at least 50 per cent to the life of steel. Copper-steel sheets should last 12 years. C. W. Gibbs, general manager, Harwick Coal & Coke Co., Pittsburgh, Pa., said that in 1925 his company bought about 100 composite cars of plain steel. These rusted badly. They were cleaned with a riveting hammer and then painted with a spray gun. The plain-steel sheets in the mine cars have lasted 5 years already and may last 10.

J. W. Paul, U. S. Bureau of Mines, Pittsburgh, Pa., said that under ordinary conditions steel mine props are not advantageous or desirable. They had been used, however, in the Georges Creek field. Adjustable steel mine props were advantageous where there is roof movement. It was stated that L. F. Gerdetz, consulting engineer, Shamokin, Pa., had used adjustable steel mine props at Jackson mine, in Maryland, in Big Vein workings with good results.

In the afternoon William MacGillivery, Midland, Mich., discussed dustless coal, saying that the cost of treatment was about 30c. per ton, which was in part compensated by the increased weight of the coal. In the question-box session conducted by Ralph Beerbower, S. P. Howell, U. S. Bureau of Mines, Pittsburgh, Pa., discussed the question why squibs or caps and fuse are preferred to electric detonators, especially in the anthracite region. He said that he had collected statistics in that region for 1923-1927, both years inclusive, and had obtained all the accident records in which explosives were involved, relating to the shooting of 80,000,000 tons of anthracite annually, with about 277,000,000 lb. of explosive.

There were 685 fatal or serious accidents. About one-third were due to premature explosions. Many, but not the majority, of these occurred when electrical blasting was being employed. Statistics showing the number of shots fired with squibs, with fuse, with cordeau, and electrically were obtained from 96 operations producing 35 per cent of all the coal mined in the region and using 35 per cent of the explosive consumed in that field.

About 4.4 per cent of the shots were with squib, 53.5 per cent with fuse and 42.1 per cent were fired electrically. In the five-year period there were about 161,000,000 shots fired in the anthracite region. Where squibs were used the accidents numbered 12.2 per million shots, where fuse was used 2.7 accidents per million shots and where shots were fired electrically, 1.9 accidents per million shots. In conclusion he said that no condition favored the use of the squib or fuse.

Pittsburgh Coal Co.'s Rules for Cutters

(1) Examine working place for gas and loose rock both before and after cutting face

(2) Examine fuse of the cutting machine before starting shift

(3) Wrap safety chain three times around cutter head and block cutter-bar guard when machine is moved under its own power from room to room

(4) Turn your head well away when putting "hot nip" on trolley wire to avoid eye flash

(5) Hang machine cable on hook in roof clear of track

(6) Lay safety block on track at mouth of room in which machine is operating or lock switch where that can be done to prevent cars being pushed in room while coal face is being cut and to prevent machine on leaving room from prematurely running out on entry

In discussing the question, "Does our present-day practice of mechanical mining with face and room conveyors tend to increase accidents?" A. Siemon, Hillman Coal & Coke Co., Pittsburgh, Pa., said that 734 accidents happened at the company's mines from 1921 to 1925 inclusive with loading unmechanized. The output was 2,583,517 tons. The accident rate therefore was one accident for 3,520 tons. Then conveyors were put in and 425,767 tons were produced by this means with 22 accidents in sections thus operated or one accident for 19,353 tons. In all operations since 1925 the output has been 2,838,897 tons; the number of accidents 399. The rate is one accident for 7,115 tons.

Mr. Wardner said that accidents to fingers increased in the first six months after the introduction of loading machines, but that the number of serious accidents declined. John Moore, Stern Coal & Coke Co., Uniontown, Pa., said that at the Jerome mine the introduction of loading equipment had reduced lost-time accidents 50 per cent.

Mr. Lindholm, a mining engineer, described operations in Spitzbergen. He said the mines produced about 210,000 tons annually. The temperature in the mines is 4.3 deg. C. below zero, and the men have to work hard to keep warm. They come mostly from Norway. They have only 3 to 4 months in which to come. Then the winter closes in and they are prisoners till the summer. They cannot leave or be discharged. They are paid $3 a day.

There are in the mining village 512 inhabitants; 40 are children. The company feeds the men charging 22 or 23c. per day. It provides shows and music. There is prohibition on the island but at Christmas the men receive a little beer, and a small quantity of toddy is given them once a month.

About 85 per cent of the coal is loaded mechanically from faces 300 ft. long. In 1919 when the mines were operated by Americans there was an explosion of coal dust in No. 1 mine in which 28 men were killed, all the men then underground. Today snow is taken into the mine and thrown around on roof, ribs and floor. This mixture of snow and coal dust is then loaded out.

As there is no gas, open lights are used. However, gas inspections are made with Wolf lamps. The mine operates on three shifts. A hard sandstone floor and roof make operation fairly safe. In five years five men have been killed, two of them while jumping on trips. The health of the men is excellent. No bacillus can thrive in the temperature, which is 7 to 11 deg. C. below zero in the open, but when the new gang comes up in the summer to replace those who have served their time, sickness is rife. Some men stay from year to year; four have been in Spitzbergen for 23 years.

The mine is almost level and located 700 ft. above the sea. The coal is from 3 to 3½ ft. thick in each of the two seams. Its analysis will show about 20 per cent volatile matter and 4 per cent ash. It makes a fine fuel for railroads and steamships. Haulage is electrical. Cutting machines electrically driven are used to assist in bringing down the coal. The mines are owned and operated by the Great Norwegian-Spitzbergen Coal Co.

On Friday, the third day, the members visited the Wildwood plant of the Butler Consolidated Coal Co., about 15 miles out of the city. This plant is complete, except for the Peale-Davis washery. The visitors inspected the slope, bottom and tipple.

Coal-Mine Fatalities Higher in November Than in October and a Year Ago

The death rate from accidents in the coal mines of the United States for the month of November was 3.44 per million tons of coal mined, as compared with 3.27 for October, 1929, and 3.18 for November, 1928. For bituminous mines alone the November rate was 2.87, as compared with 2.99 for the preceding month, 2.93 for November a year ago and with 3.84 for March and 2.76 for January, the high and low points of the present year. The death rate in November for anthracite mines alone was 7.78, an increase over November a year ago, owing to a smaller production and a greater number of fatalities.

These figures are based on accident reports received by the Bureau of Mines from state mine inspectors and on current reports to the Bureau covering the production of coal. Reports for November showed that 178 deaths occurred in the coal mines of the country. Included in this number were 131 deaths in bituminous mines and 47 in anthracite mines. During November, 45,677,000 tons of bituminous coal and 6,042,000 tons of anthracite were mined. For November a year ago there were reported 137 deaths and 46,788,000 tons in bituminous and 35 deaths and 7,322,000 tons in anthracite mines.

Reports for the first eleven months of 1929 showed that 1,917 deaths had occurred in connection with the mining of 548,140,000 tons of coal, which is an improvement over the same months of 1928, which showed 2,003 deaths and 525,896,000 tons. The fatality rates for the two periods were 3.50 and 3.81, respectively. The fatality rate for bituminous mines alone for the eleven-month period was 3.09, based on 1,481 deaths and 479,158,000 tons; the rate for anthracite mines was 6.32, based on 436 deaths and 68,982,000 tons. The fatality rates for the 1928 period were 3.49 for bituminous and 5.92 for anthracite.

The month of November was free from major disasters—that is, disasters causing the loss of 5 or more lives—but there were 5 such disasters, in the preceding months of 1929, with a resulting loss of 83 lives. In 1928, for the same period, there were 13 major disasters which caused the death of 320 men. Based exclusively on these disasters the death rates per million tons were 0.15 for the present year and 0.61 during the corresponding eleven months a year ago.

Comparative fatality rates for 1929 and 1928 are shown in detail in the following table:

	1928	Jan.-Nov., 1928	Jan.-Nov., 1929
All causes	3.777	3.809	3.497
Falls of roof and coal	1.854	1.856	1.943
Haulage	.626	.614	.648
Gas or dust explosions:			
Local explosions	.087	.089	.080
Major explosions	.566	.609	.142
Explosives	.128	.122	.148
Electricity	.153	.158	.137
Other causes	.363	.361	.399

Winter Explosion Hazard Stressed by Lambie

Officials and employees in West Virginia mines have been reminded by R. M. Lambie, Chief of the State Department of Mines, of the increased explosion hazard in the winter months. In discussing the situation, Chief Lambie said that: "The supervising official must be on the job at all times and must not only see that all necessary supplies are furnished for the safe and efficient operation of the mines but also that the following requirements are made effective at once and complied with by all persons in or about the mines: adequate ventilation; proper inspection; the use of permissible powder; intelligent and regular inspection and instruction of miners by foremen; proper placing and charging of shots; permissible machinery in gaseous mines; rock-dusting, and the cleaning up of all dry coal dust."

C.&O. Builds Branch Line

Construction of 43 miles of branch line to reach coal and timber lands in the vicinity of Pikesville, Ky., has been started by the Chesapeake & Ohio and Hocking Valley railroads. The project will require an expenditure of $7,000,000 and is to be completed in 1932.

Coal Mine Fatalities During November, 1929, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipe	Railway cars and locomotives	Other causes	Total	1929	1928
Alabama	2	....	1	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	5
Arkansas	1	....	....	....	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Colorado	2	1	1	....	1	....	....	1	....	....	....	6	....	....	....	....	....	....	....	....	....	....	....	....	6	3
Georgia and North Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Illinois	6	....	2	....	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	8	21
Indiana	1	....	....	....	....	....	....	....	1	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	1
Iowa	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	2
Kansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Kentucky	9	1	2	....	....	....	1	....	....	....	....	13	....	....	....	....	....	....	....	....	....	....	....	....	13	22
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Missouri	1	....	....	....	....	....	....	....	....	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Montana	1	....	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
New Mexico	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Ohio	3	....	....	....	....	....	....	....	....	....	1	4	1	....	....	....	1	....	....	....	....	....	....	....	5	5
Oklahoma	1	....	1	....	1	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	4
Pennsylvania (bituminous)	17	4	5	....	....	....	....	....	....	....	1	27	....	....	....	....	....	....	1	....	....	1	....	2	29	18
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Utah	4	....	1	....	....	....	....	....	....	....	1	6	....	....	....	....	....	....	....	....	....	....	....	....	6	4
Virginia	4	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	4	1
Washington	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	0
West Virginia	22	10	7	....	1	....	1	....	....	....	....	41	....	....	....	....	....	1	....	....	....	....	1	2	43	45
Wyoming	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Total (bituminous)	77	16	20	....	4	....	3	1	1	....	4	126	1	....	....	....	....	2	....	..	.....	1	1	4	131	137
Pennsylvania (anthracite)	13	11	9	3	3	....	2	....	....	....	5	46	....	....	....	....	1	....	1	..	.....	....	....	1	47	35
Total, November, 1929	90	27	29	3	7	....	5	1	1	....	9	172	1	....	....	....	1	2	1	..	.....	1	1	5	178	....
Total, November, 1928	89	11	34	10	4	....	4	2	1	....	6	161	1	....	....	1	2	2	2	1	1	1	2	9	....	172